

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

June 1978
NSRP 0005

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

REAPS 5th Annual Technical Symposium Proceedings

Paper No. 8: The Hitachi HICAS System

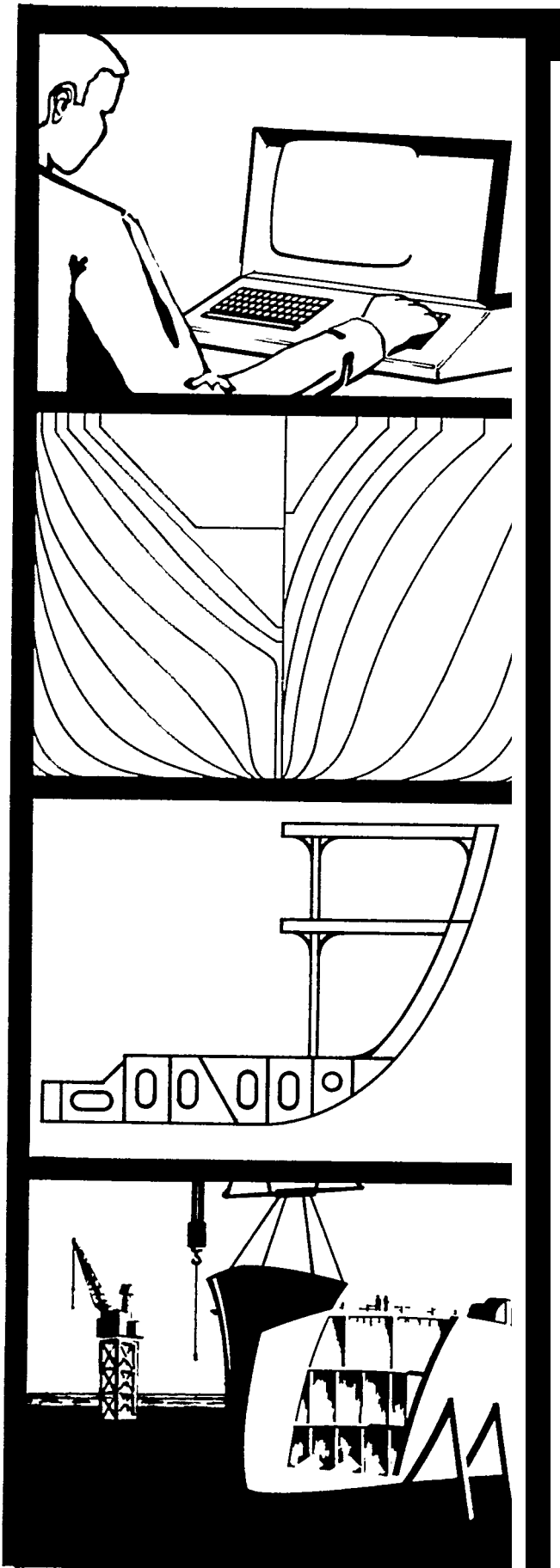
U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

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R ESEARCH
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A NGINEERING
P FOR
S AUTOMATION
AND
PRODUCTIVITY
IN
SHIPBUILDING

Proceedings of the
REAPS Technical Symposium
June 27-28, 1978
St. Louis, Missouri



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THE HITACHI HICAS SYSTEM

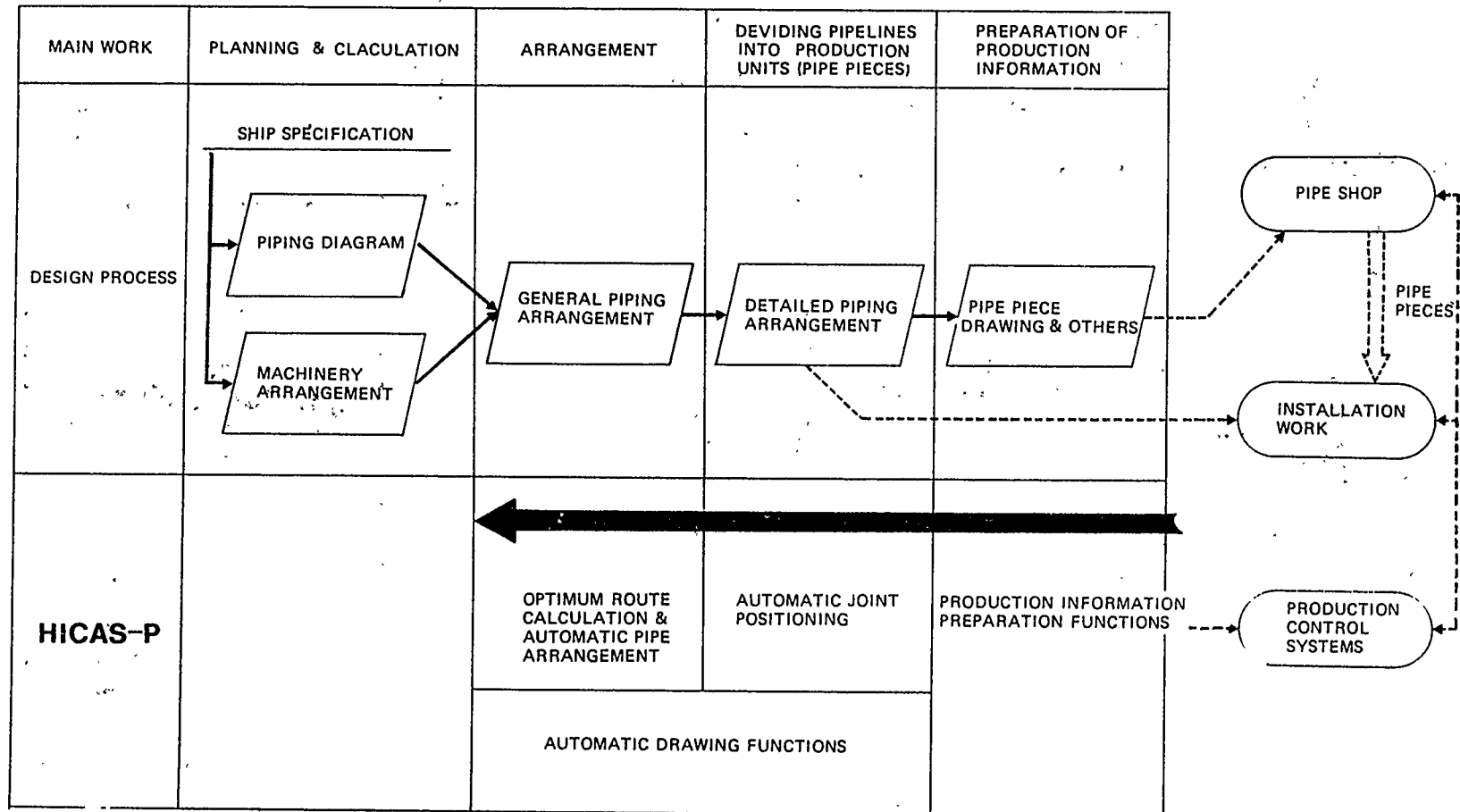
Masaru Ueda
Hitachi Zosen Information Company, Ltd.
Tokyo, Japan

As Chief of the Applied Engineering section at Hitachi, Mr. Ueda is responsible for several applied engineering systems including a piping design system and an electrical cable system. His past experience involved planning and development of piping design computerization.

Mr. Ueda attended Osaka Prefecture University, Industrial Engineering Department.

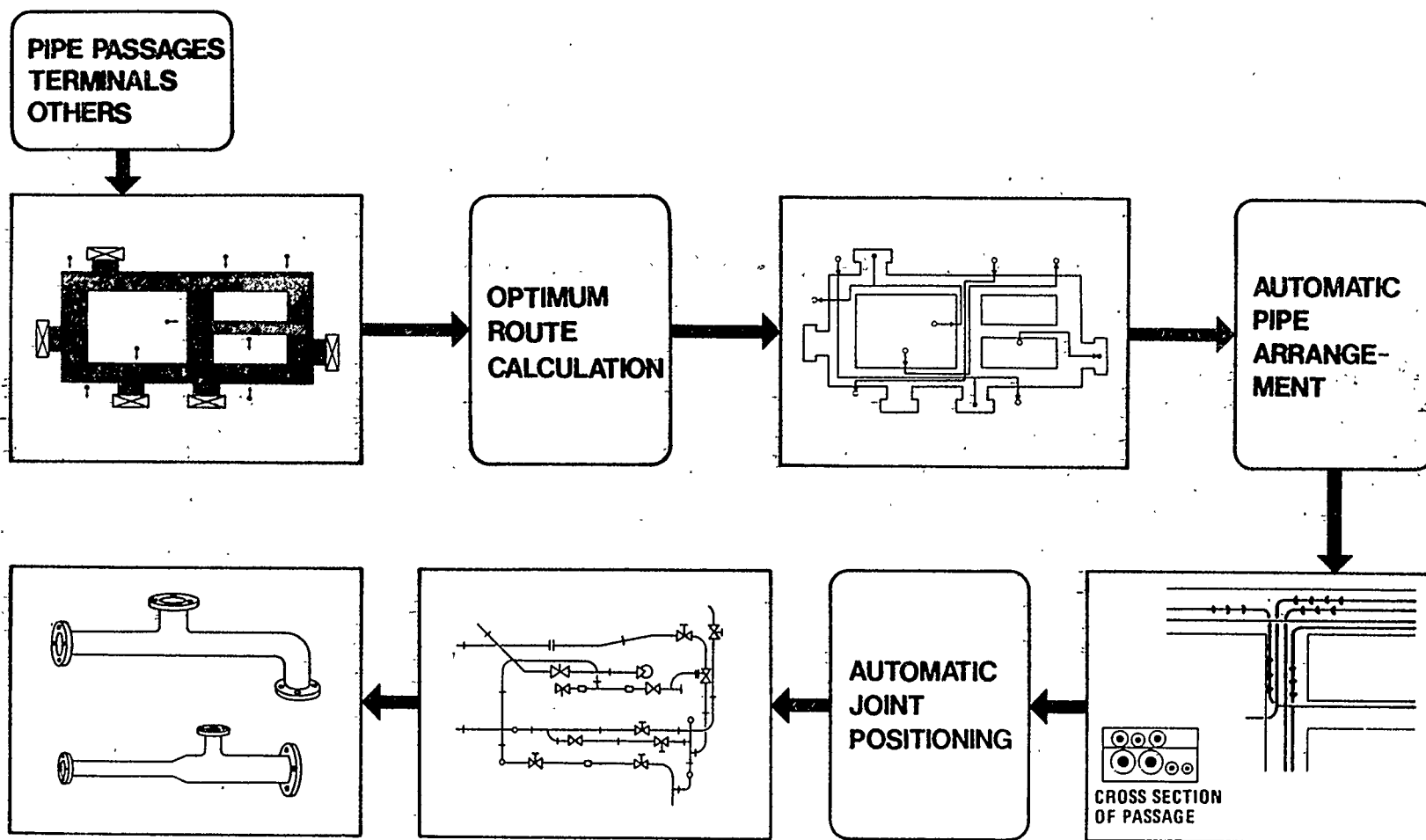
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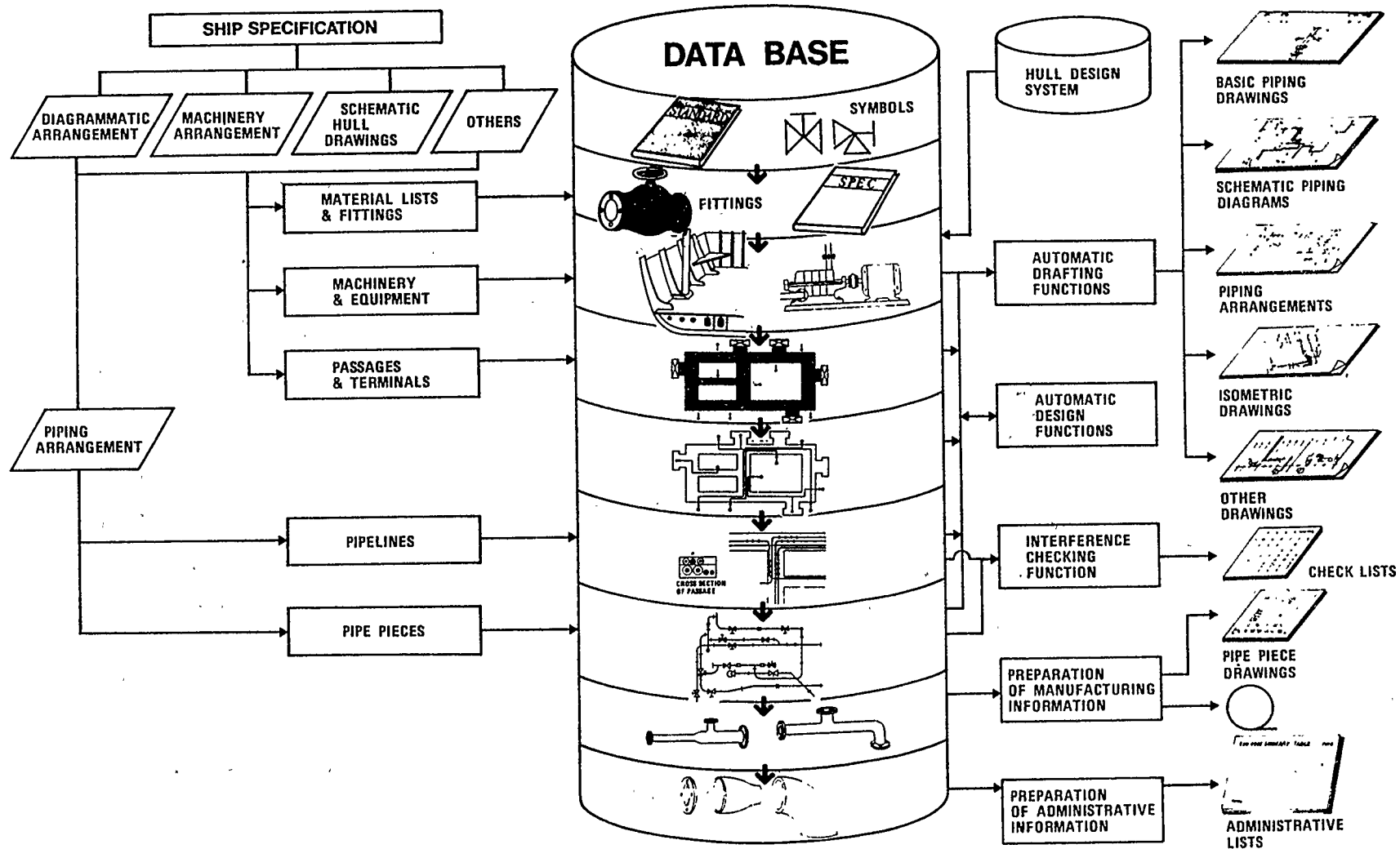




HICAS-P

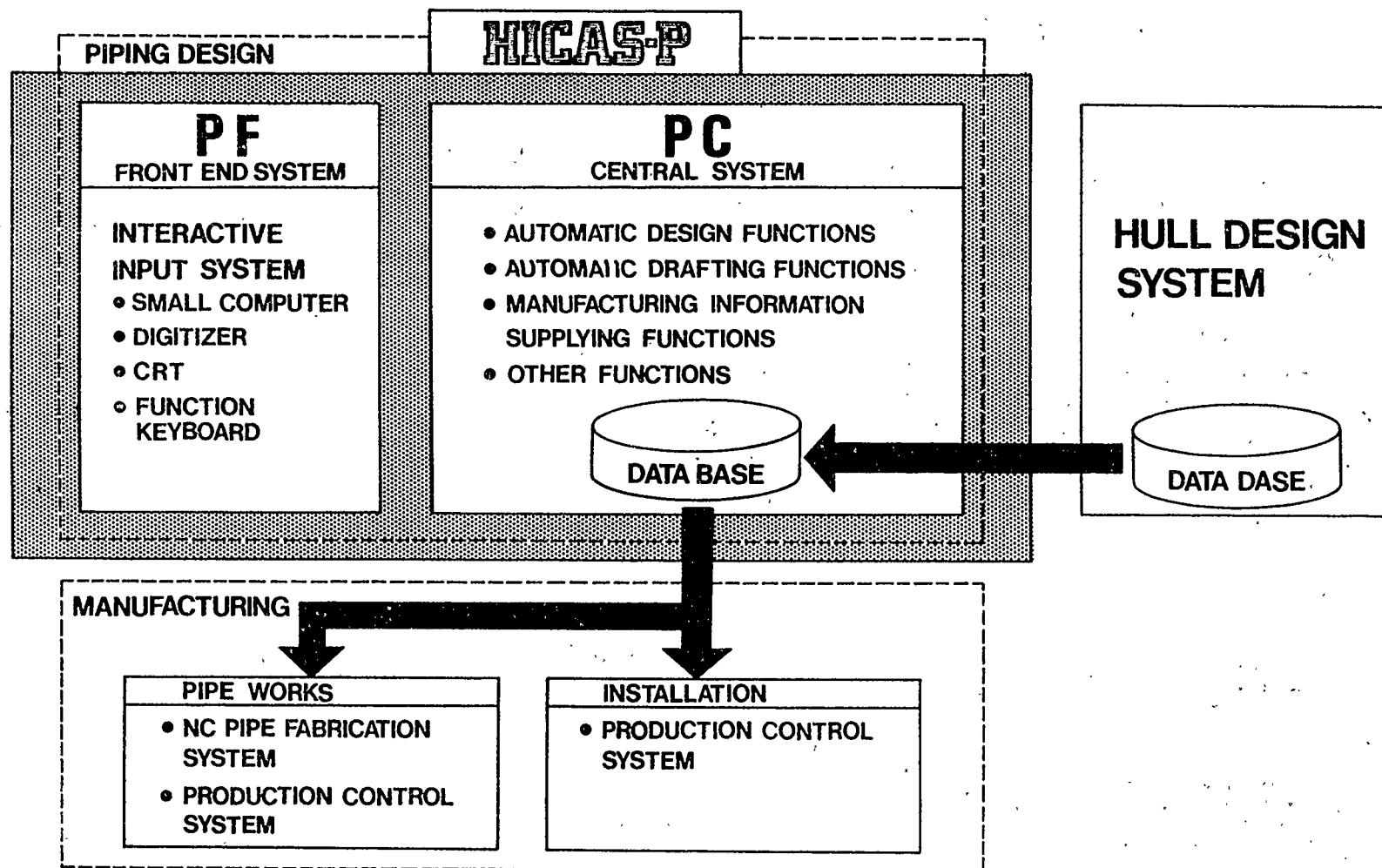
AUTOMATIC DESIGN FUNCTIONS

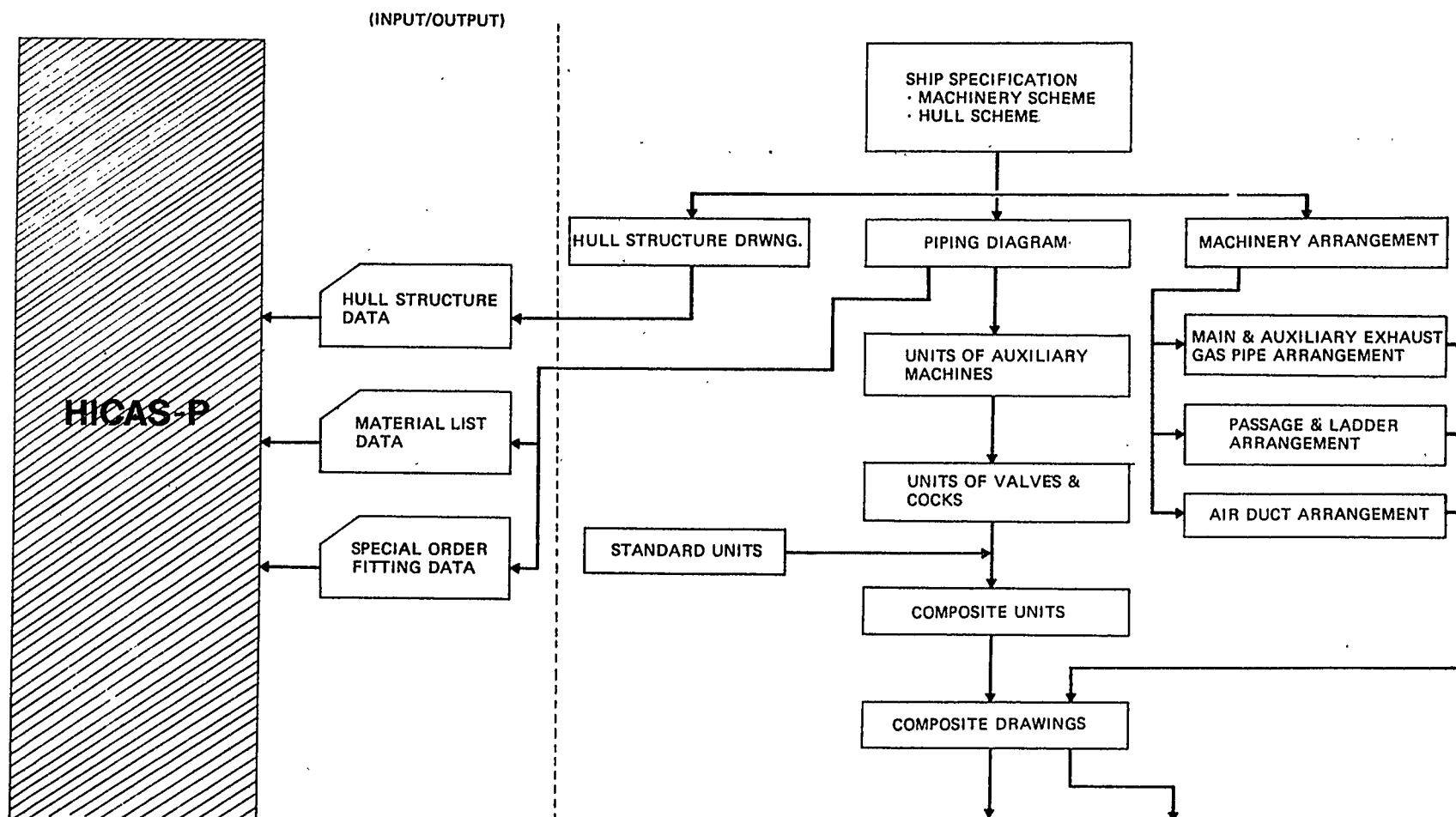




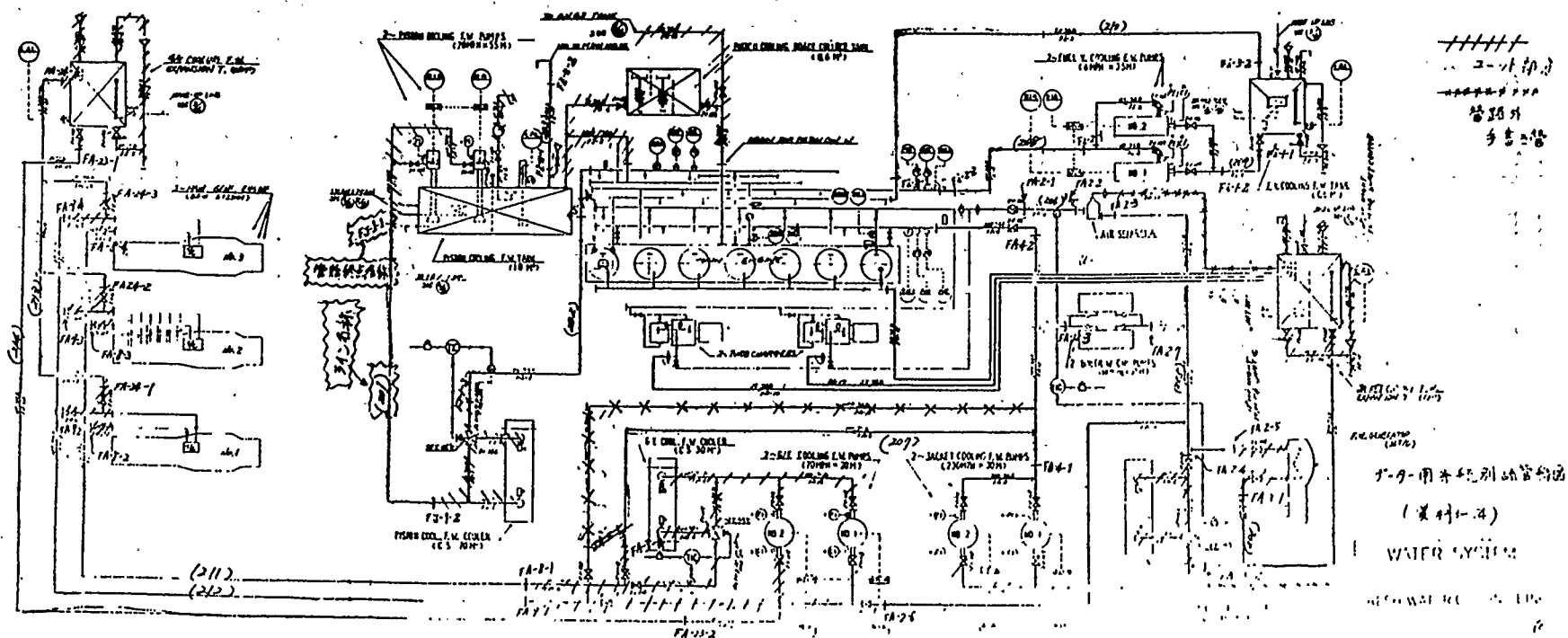
HICAS-P

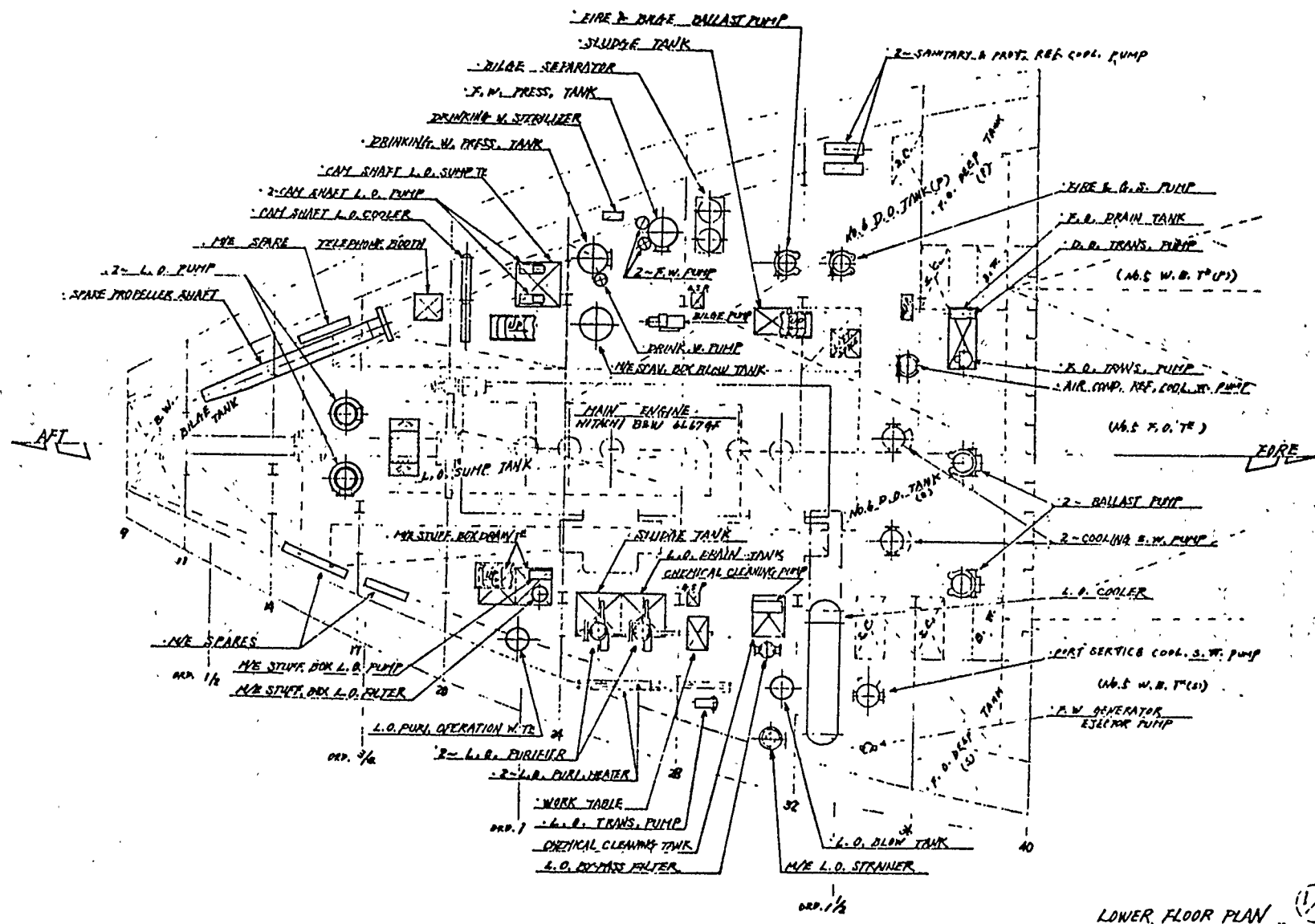
SYSTEM COMPOSITION





PIPING DIAGRAM

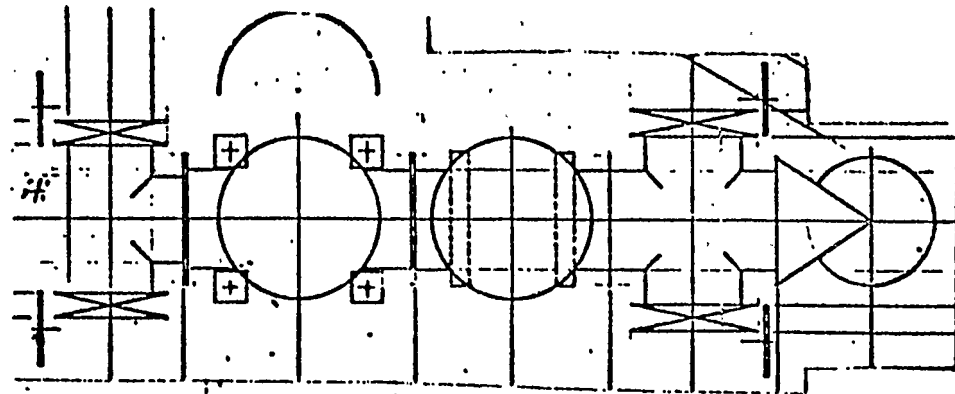
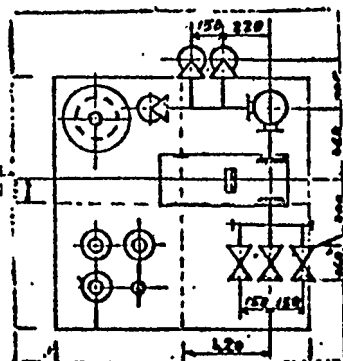
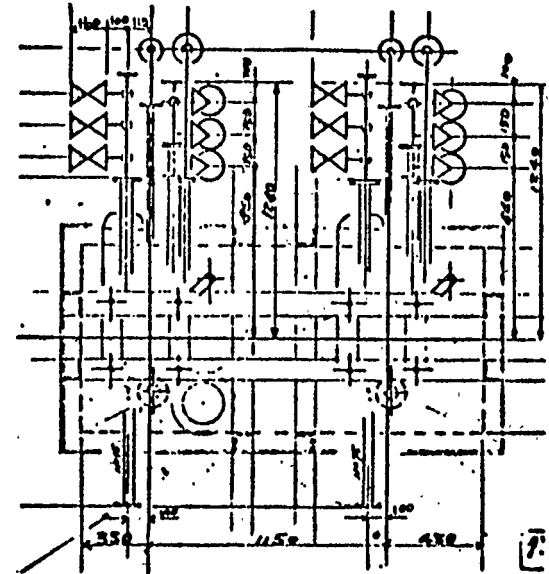
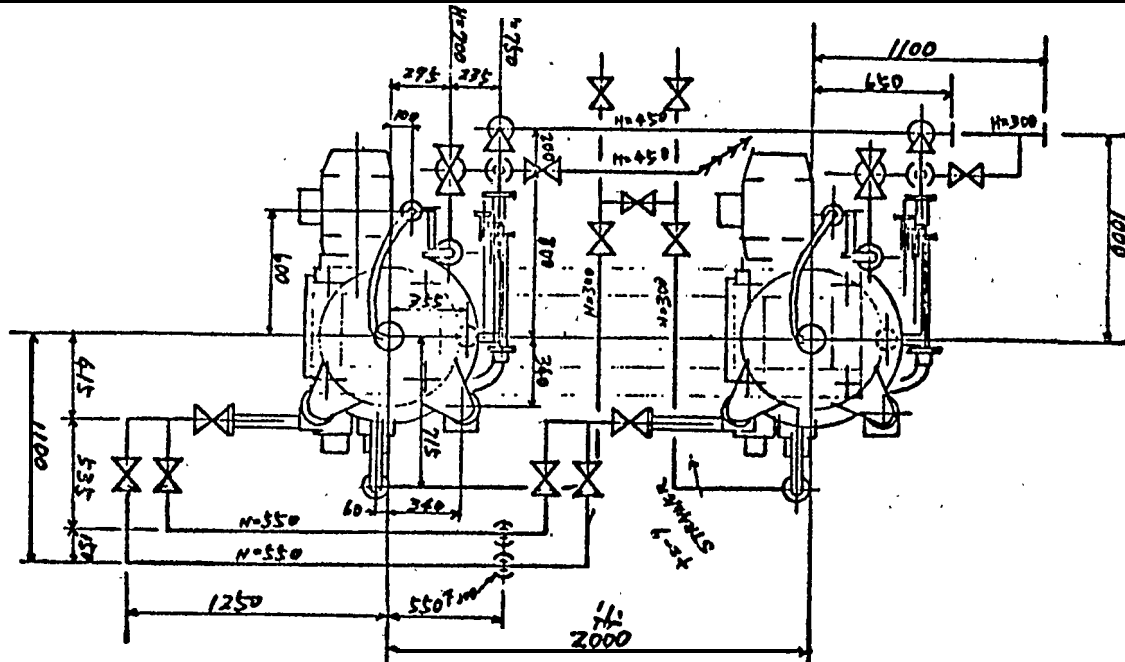


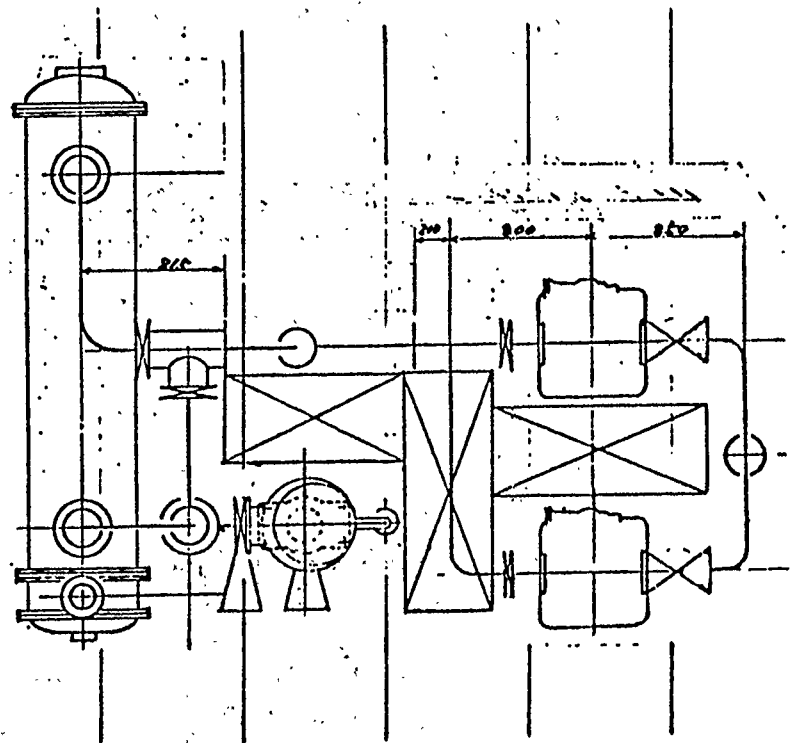
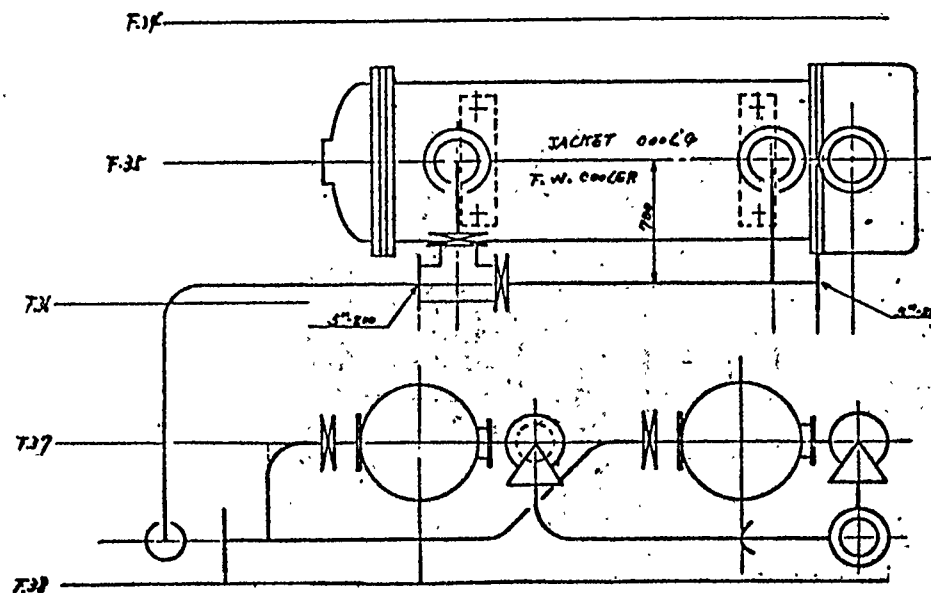


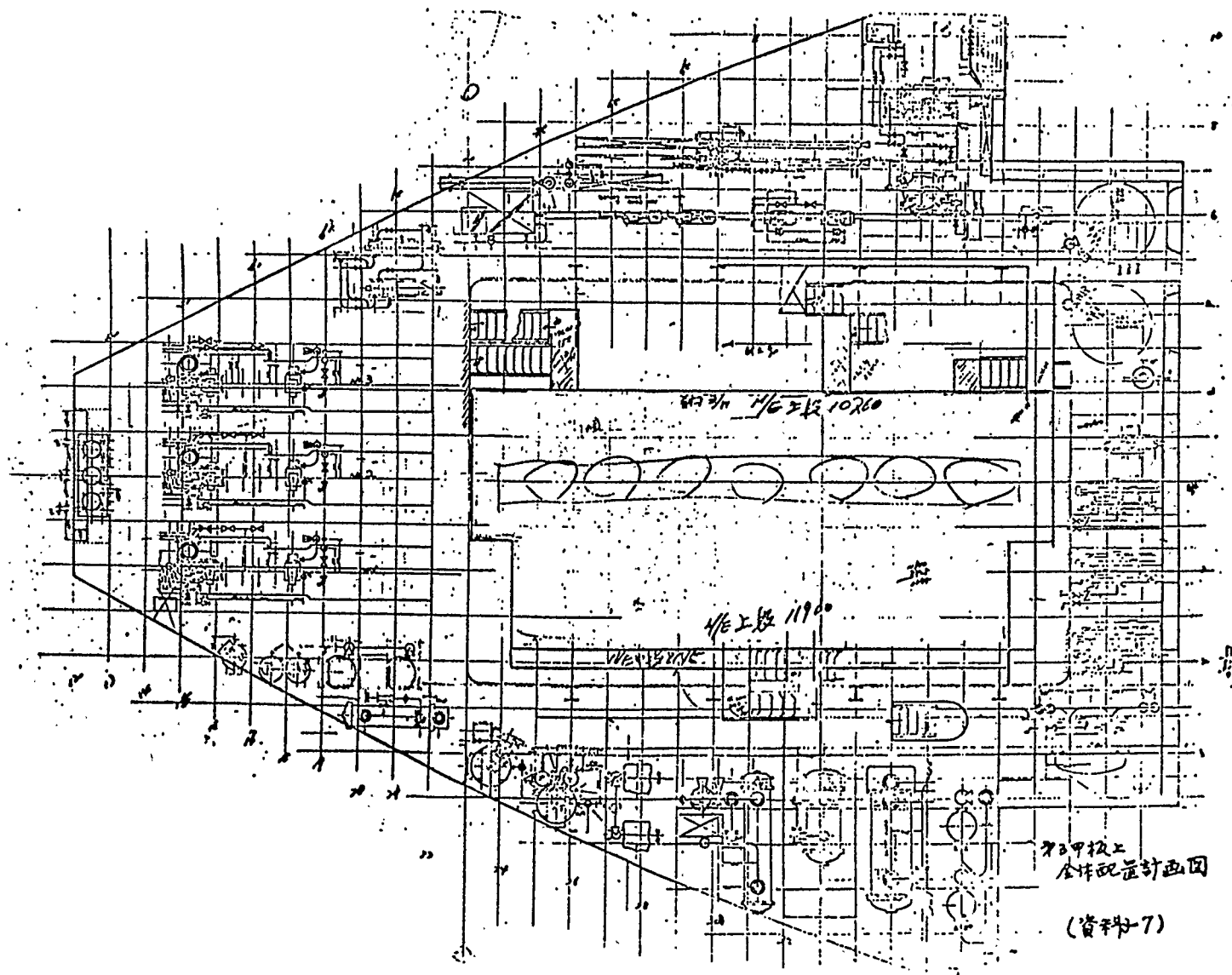
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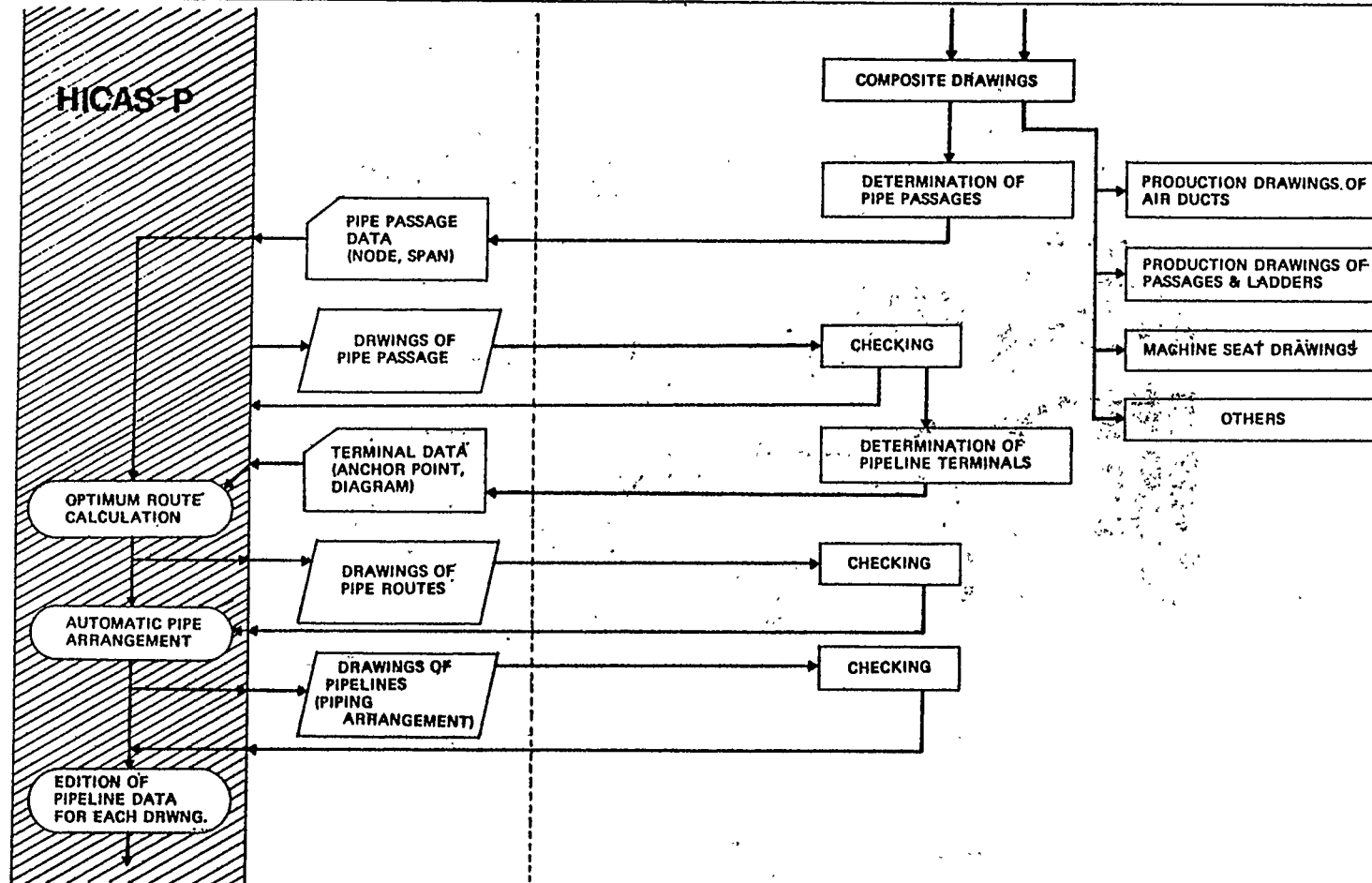
PIPING UNIT

204



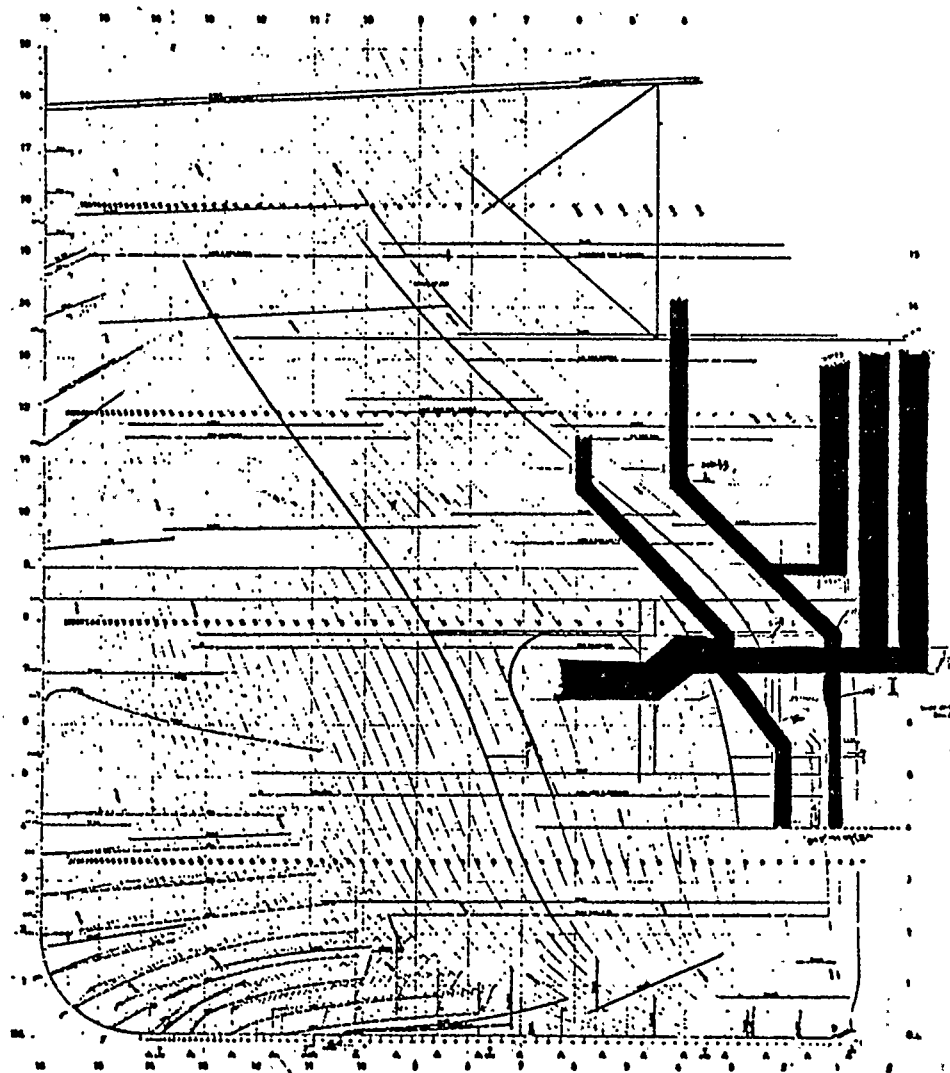




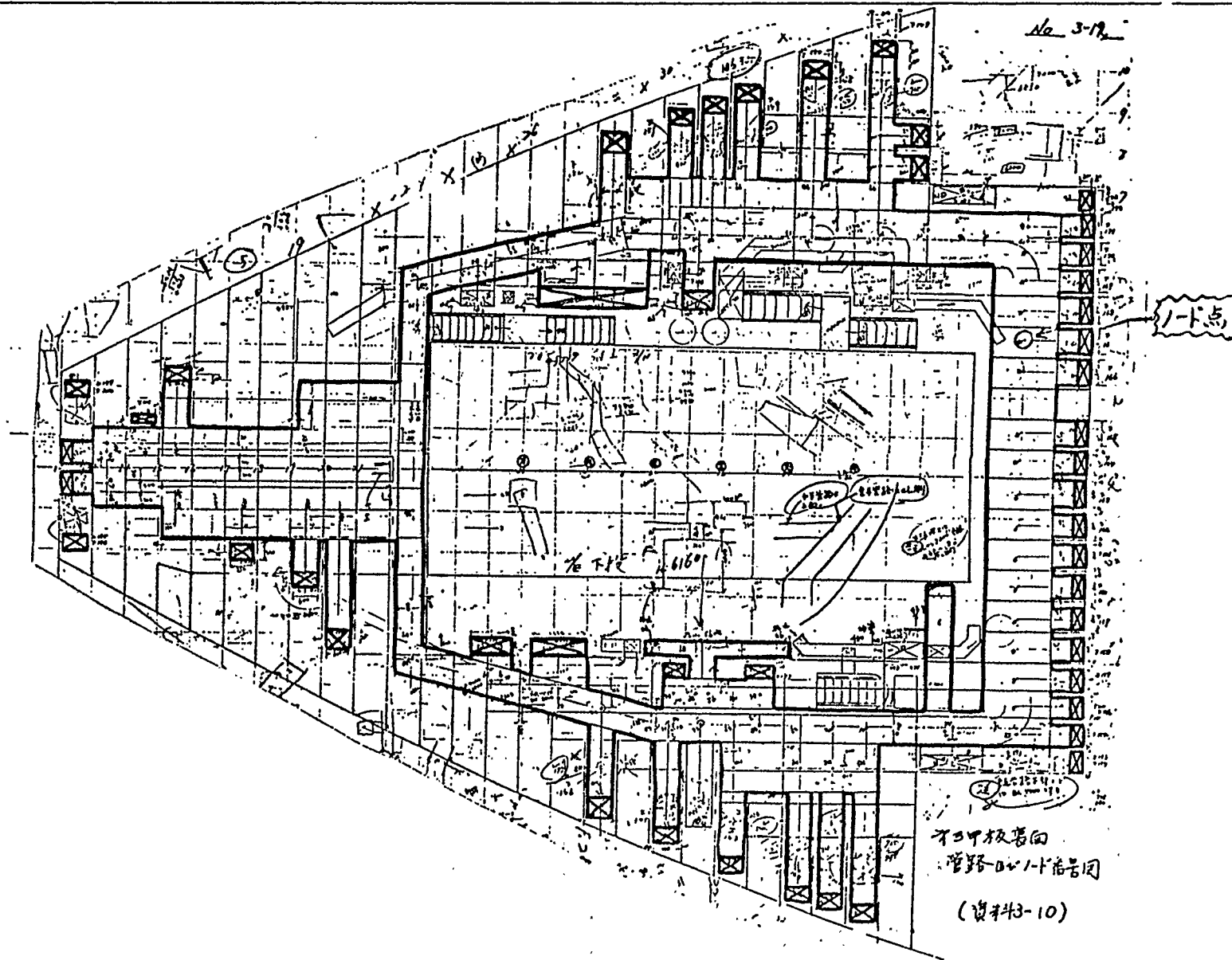


HICAS-P

DETERMINATION OF PIPE PASSAGES (VERTICAL PASSAGES)

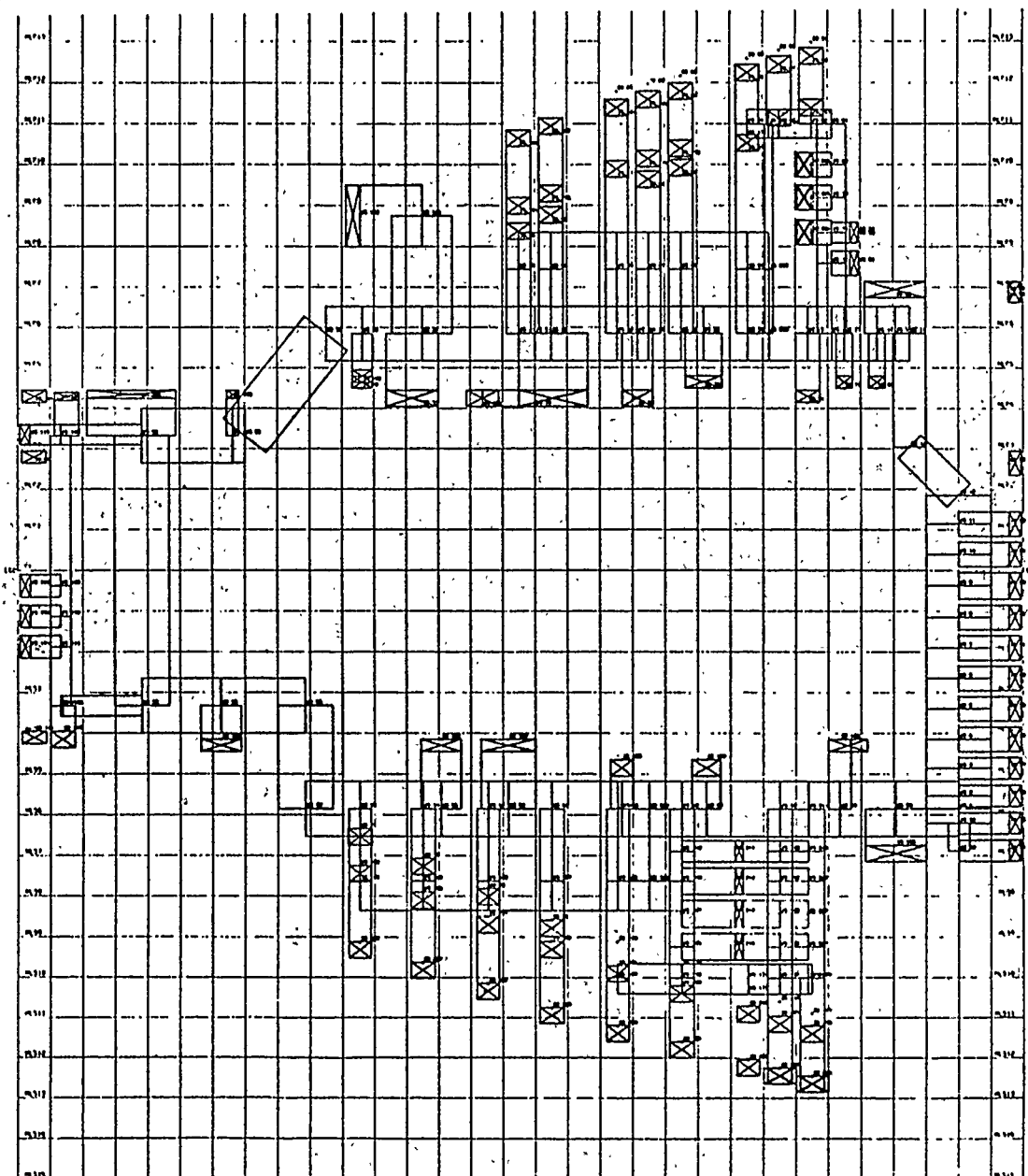


DETERMINATION OF PIPE PASSAGES (HORIZONTAL PASSAGES)

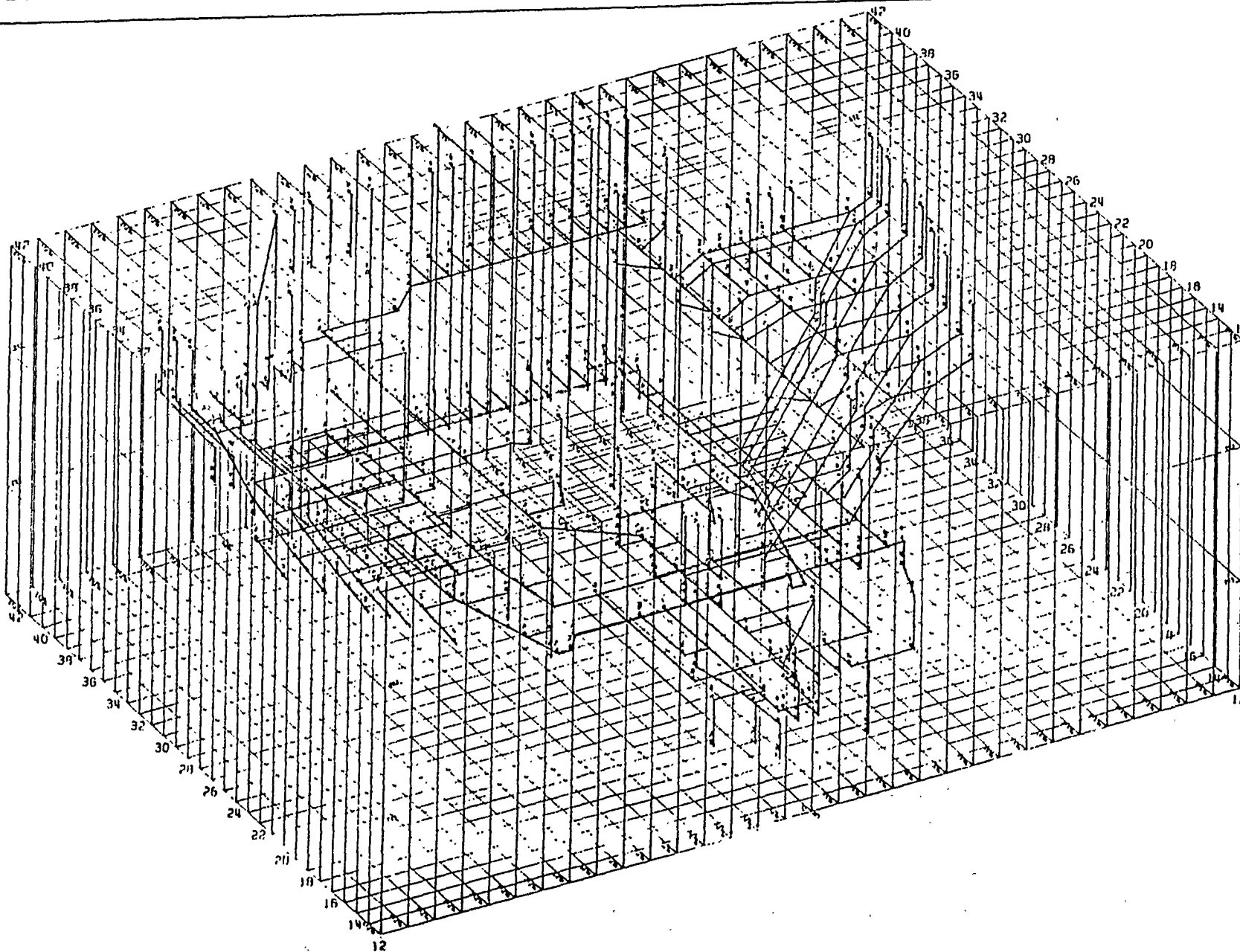


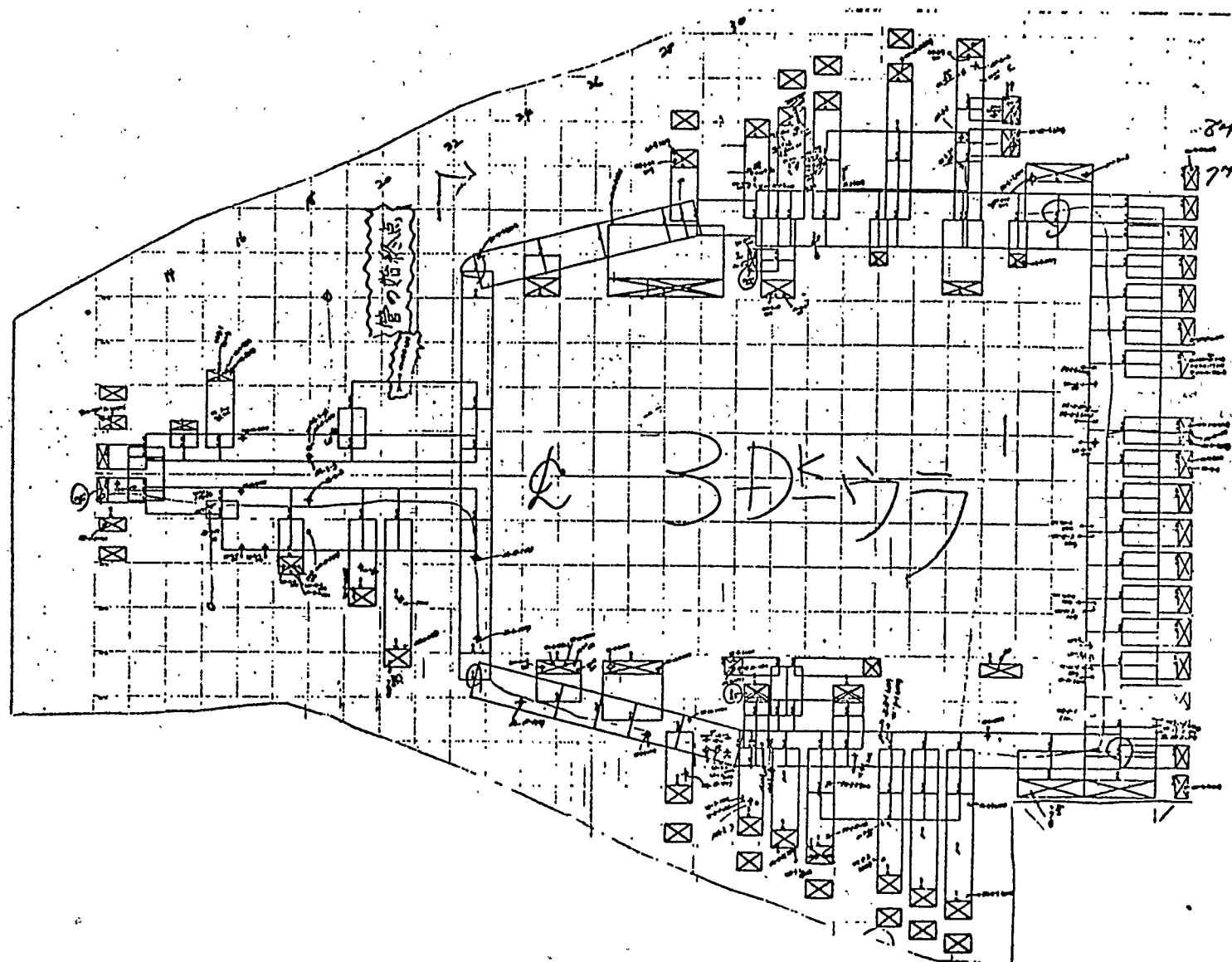
HICAS-P

DRAWING OF PIPE PASSAGES (PLAN)

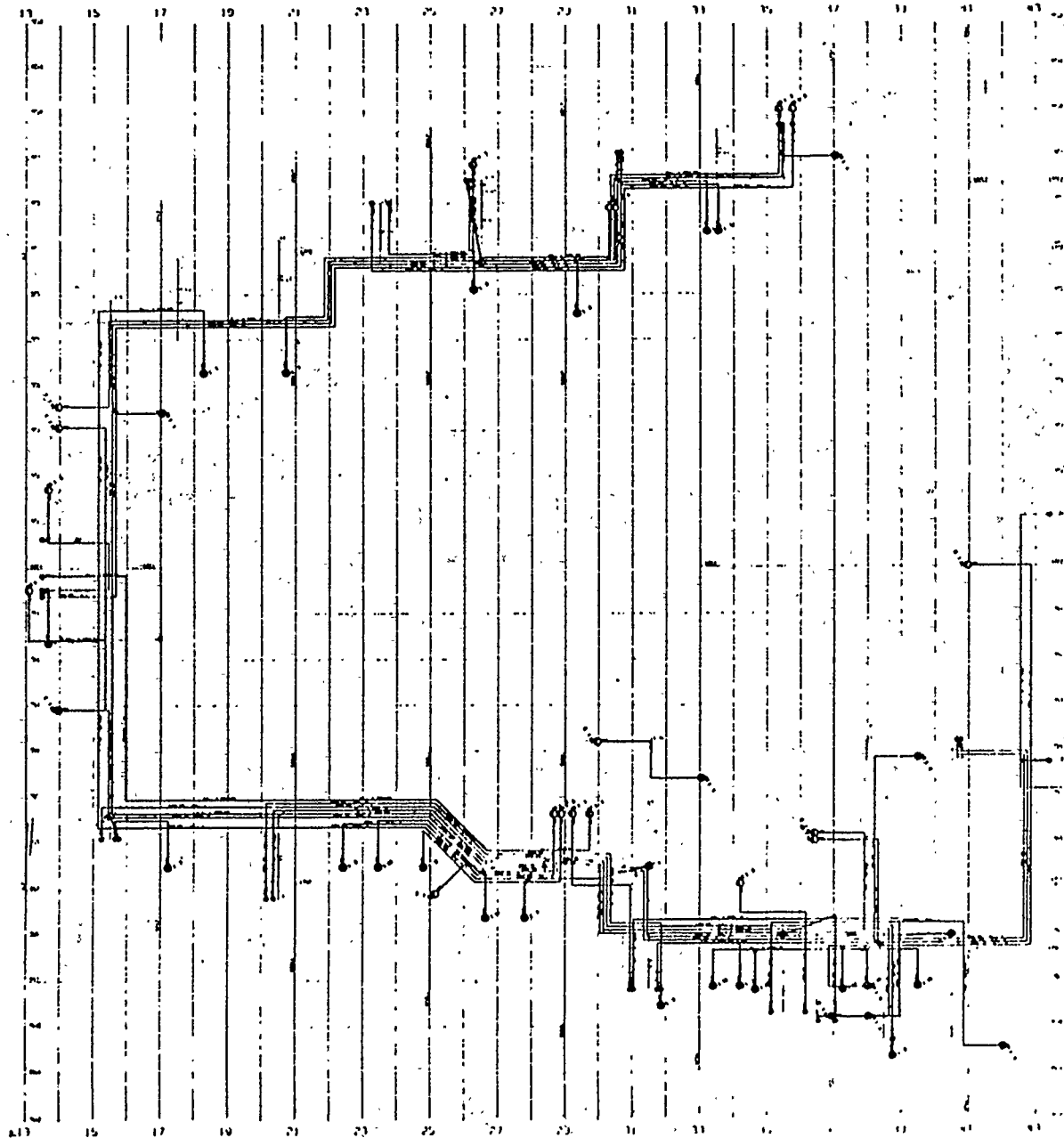


DRAWING OF PIPE PASSAGES (ISOMETRIC VIEW)



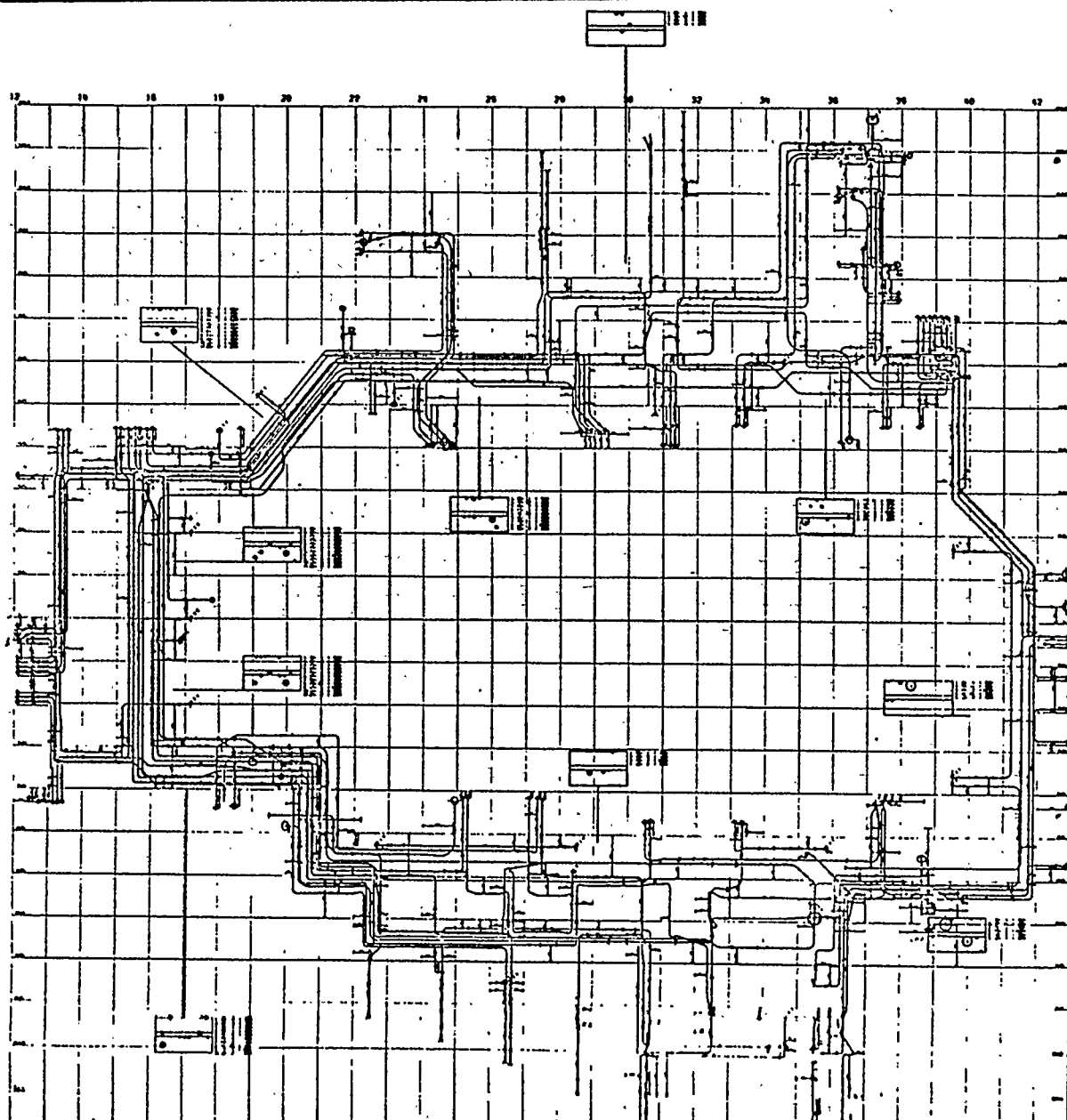


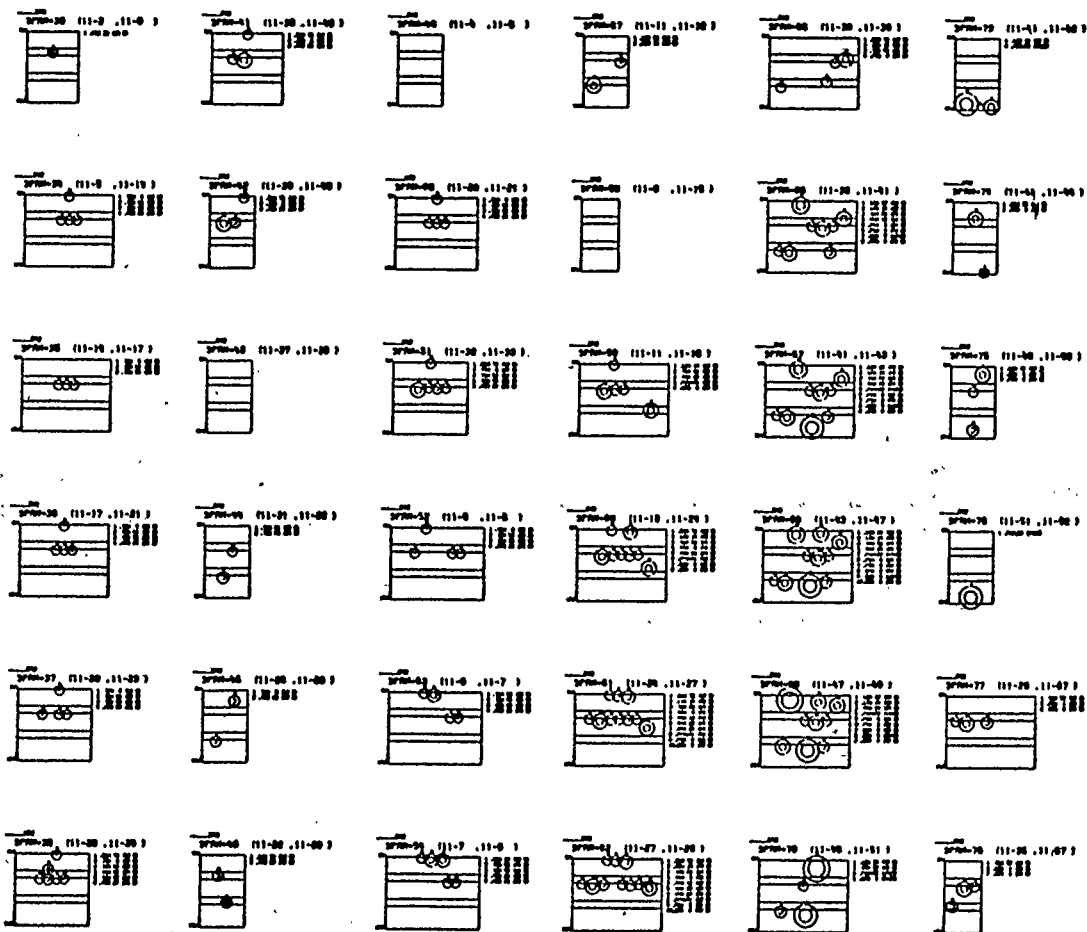
DRAWING OF PIPE ROUTES



HICAS-P

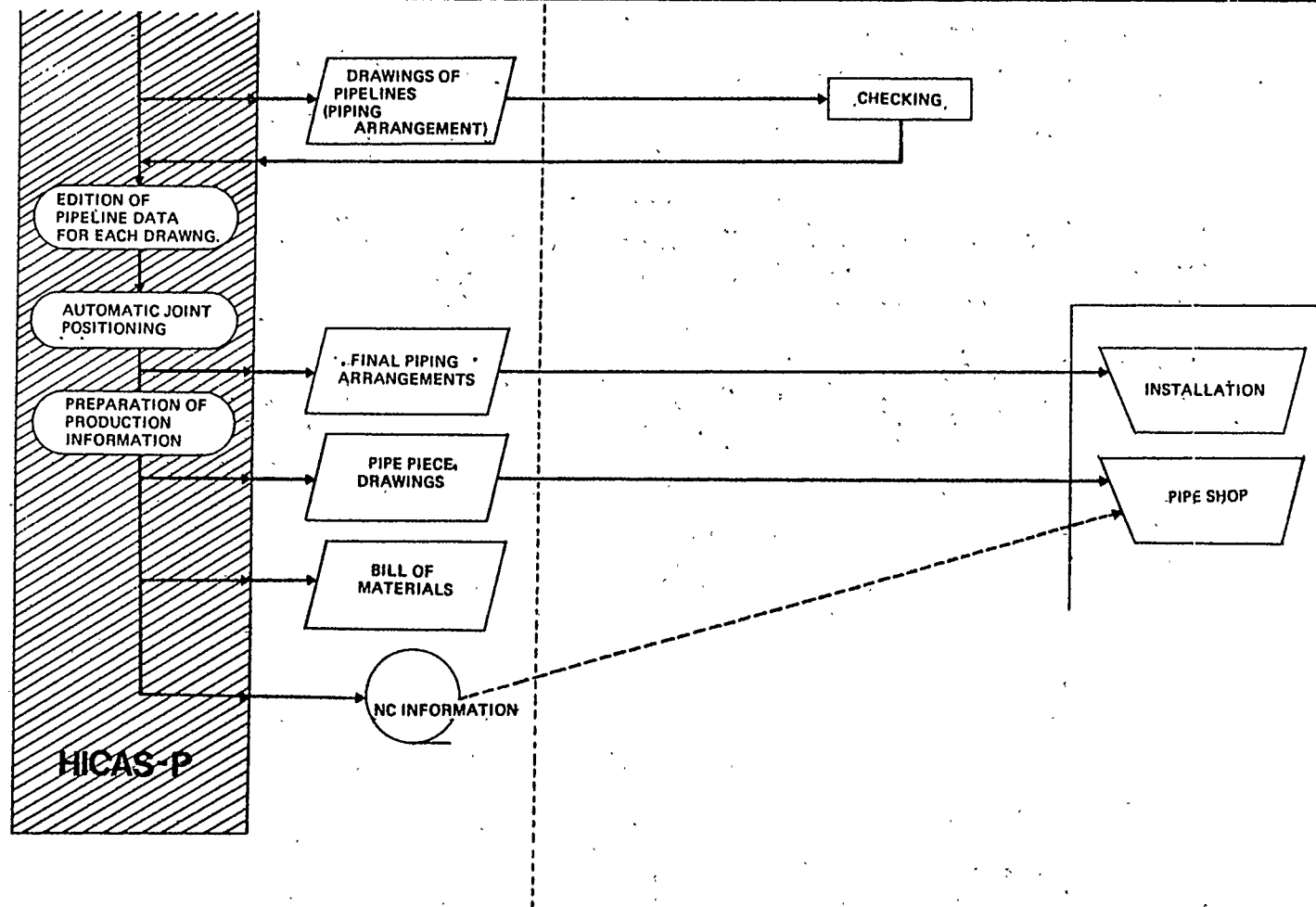
PIPING ARRANGEMENT



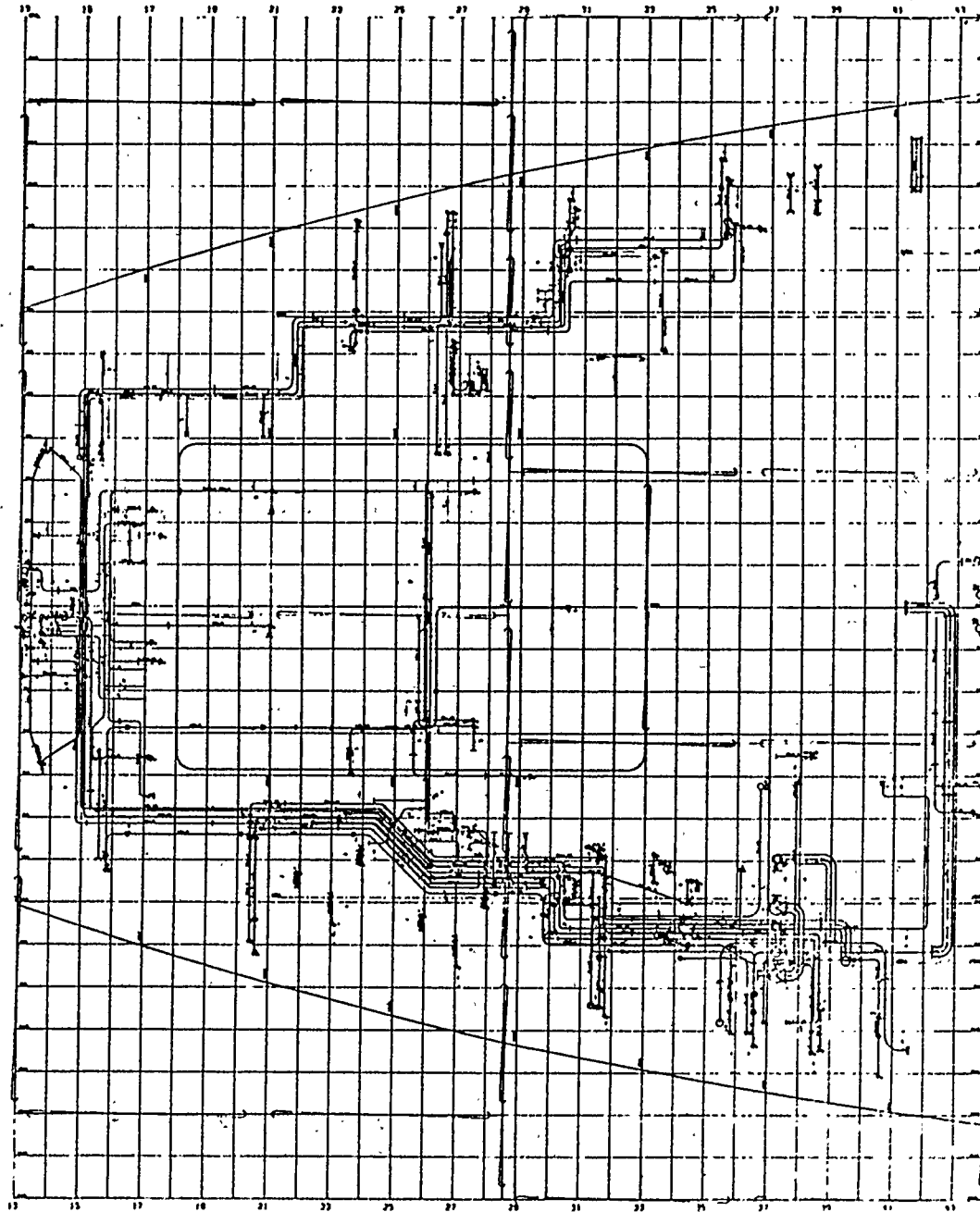


HICAS-P

PIPING DESIGN PROCEDURE using HICAS-P (STEP 3)



FINAL PIPING ARRANGEMENT



PIPE PIECE DRAWING

218

S-N0.4484(M)		SHEET NO.77A80321(REV-)		DATE:76/02/21		PAGE: 47: 1	
DIV:M32		BLOCK:		UNIT:		S-UNIT: STAGE:K	
<PIPE NO.>		< TREATMENT TABLE >					
PIPE PIECE NO.		NUMBER		PRESS X-RAY PLAT ANNEAL		IN PAT. OUT PAT.	
AM- 980 -		1		Z			

< MATERIAL TABLE >				< MANUFACTURING TABLE >			
POINT	NAME	ADJ.	MATERIAL	NUM	CUT.L	WELD	FA M.L
1-	41 JGB-	- 25-	SCP-B	1	1421		
41	F - 10-	25-	SS41	1		OK	0.01
11	F - 10-	25-	SS41	1		OK	9.51

< BENDING INFORMATION >							
1ST. P. L	NC-L	FA	A	L	NC-L	RA	A
1	1276	7761	45.0	90.0	610	4731	-90.0 9.4

< MEASUREMENTS OF PIPE PIECE >							
FM	TOLKIND	ANG	OTHER	NAME	X	Y	Z
-	11	FL		F - 10- 25-			
1-	21	BR	9		600		
2-	31	BR	90		600	100	
3-	41	FL		F - 10- 25-			278
MM TOTAL LENGTH: X= 1200 Y= 100 Z= 278					TOTAL HEIGHT: 6KG		

M:	/	IC:	/	ID:	/	IE:	/	IM:	/	IG:	/	IS:	/	IE:	/	IM:	/
----	---	-----	---	-----	---	-----	---	-----	---	-----	---	-----	---	-----	---	-----	---

PRODUCTION INFORMATION

MATERIAL LIST

BENDING INFORMATION

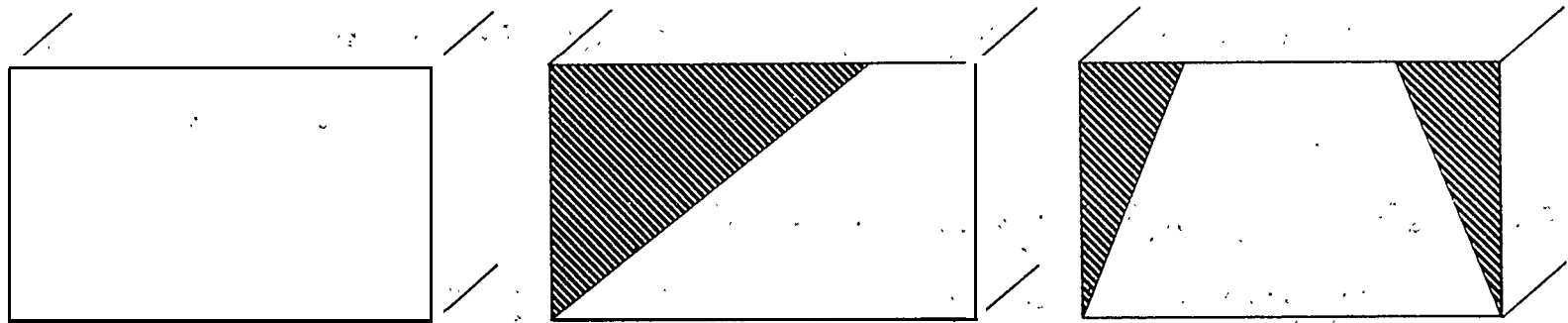
SHAPE OF PIPE PIECE (PROJECTION)

MEASUREMENTS OF PIPE PIECE

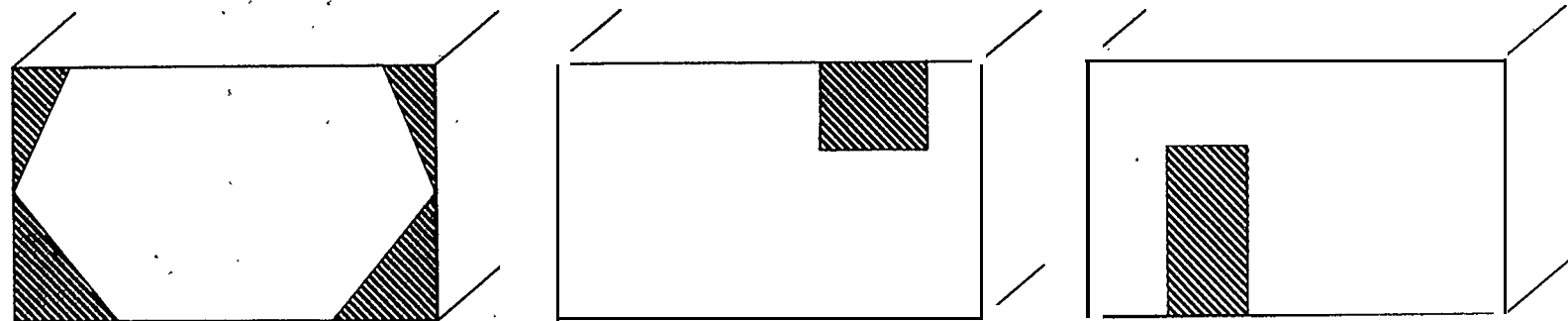
HICAS-P

MAIN FUNCTIONS

- **AUTOMATIC DESIGN FUNCTIONS**
- **AUTOMATIC DRAWING FUNCTIONS**
- **CHECKING FUNCTIONS**
- **FUNCTIONS TO SUPPLY VARIOUS LISTINGS**
- **FUNCTIONS TO SUPPLY PRODUCTION INFORMATION**
- **FUNCTIONS TO CONNECT WITH OTHER SYSTEMS**
- **INTERACTIVE INPUT STATION (PF SYSTEM)**

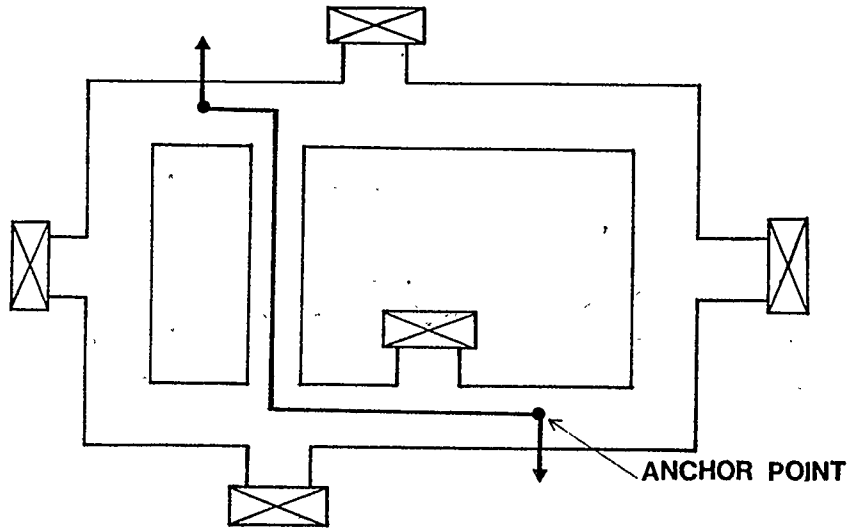


(BASIC SHAPE)

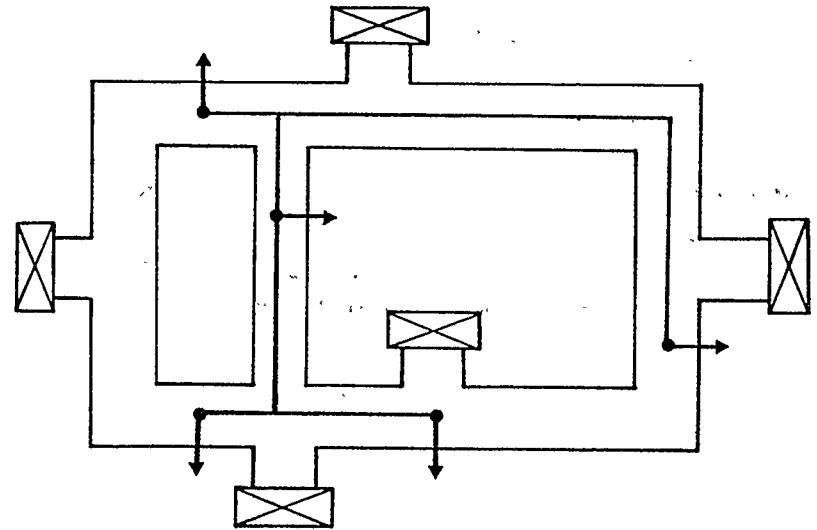


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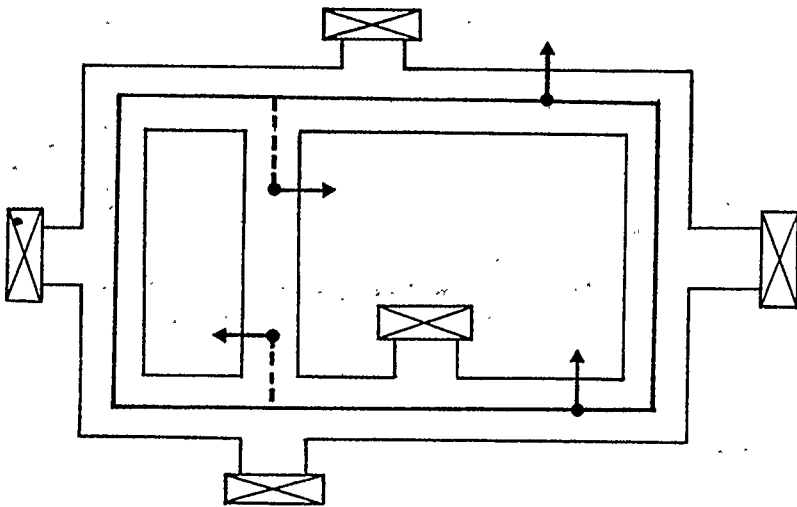
1 ANCHOR POINT—ANCHOR POINT



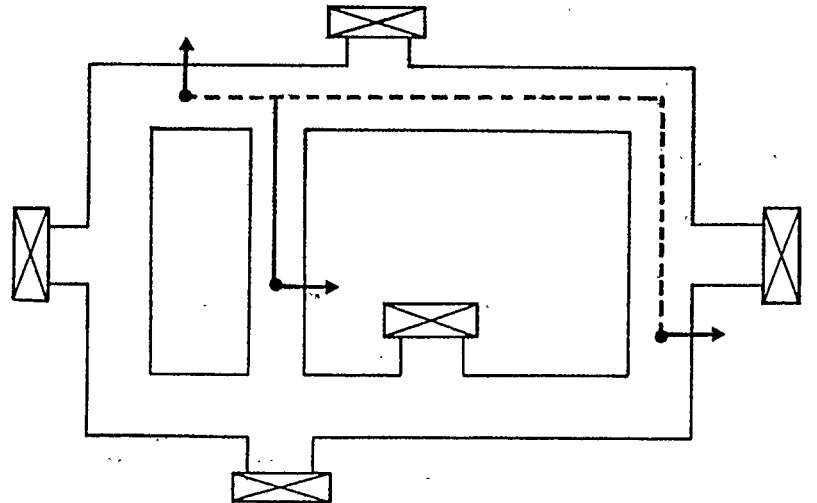
2 GROUPING

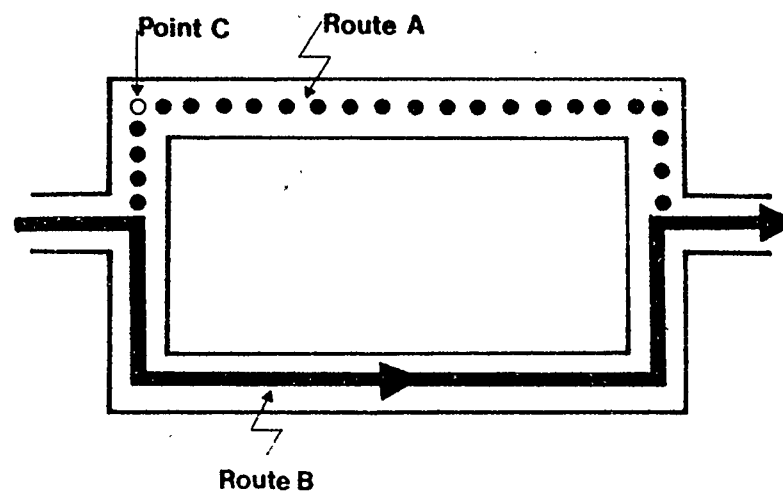
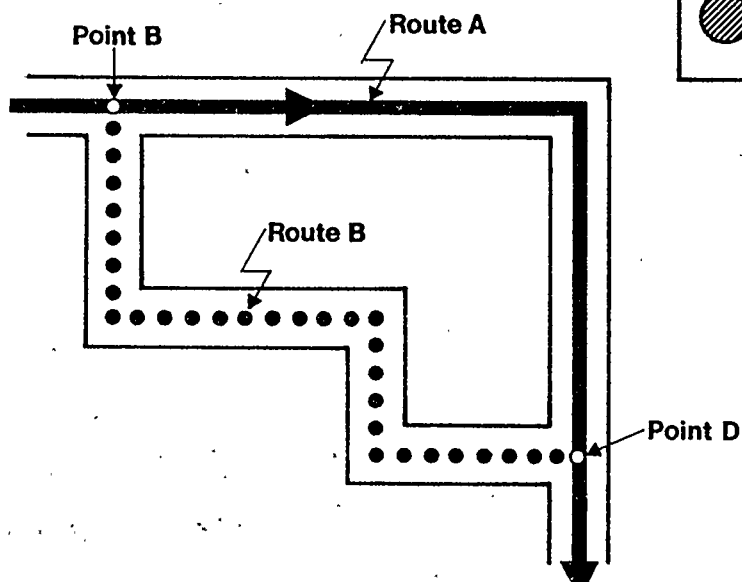
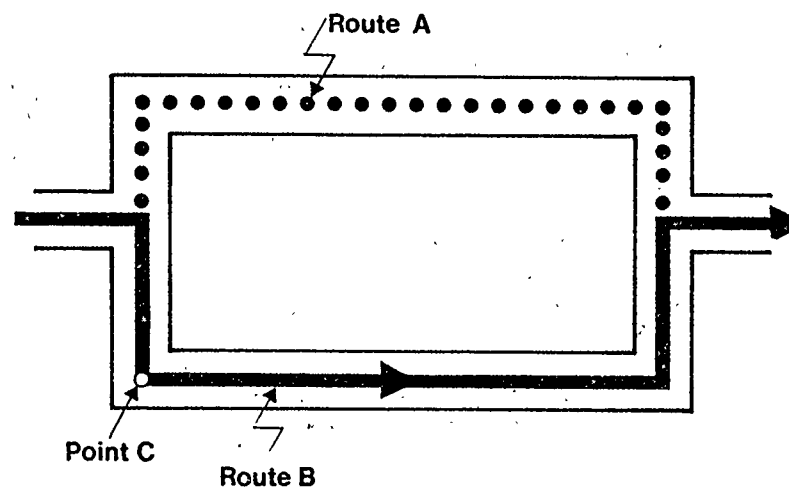
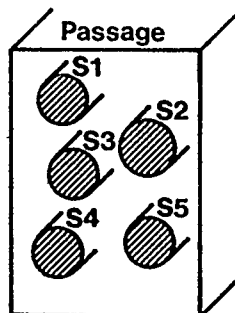
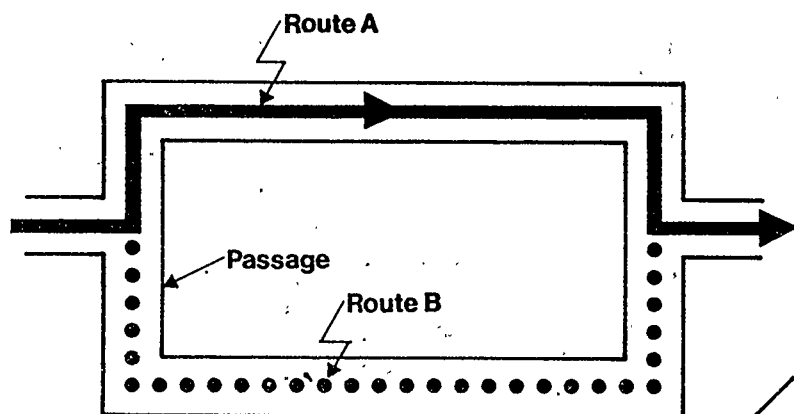


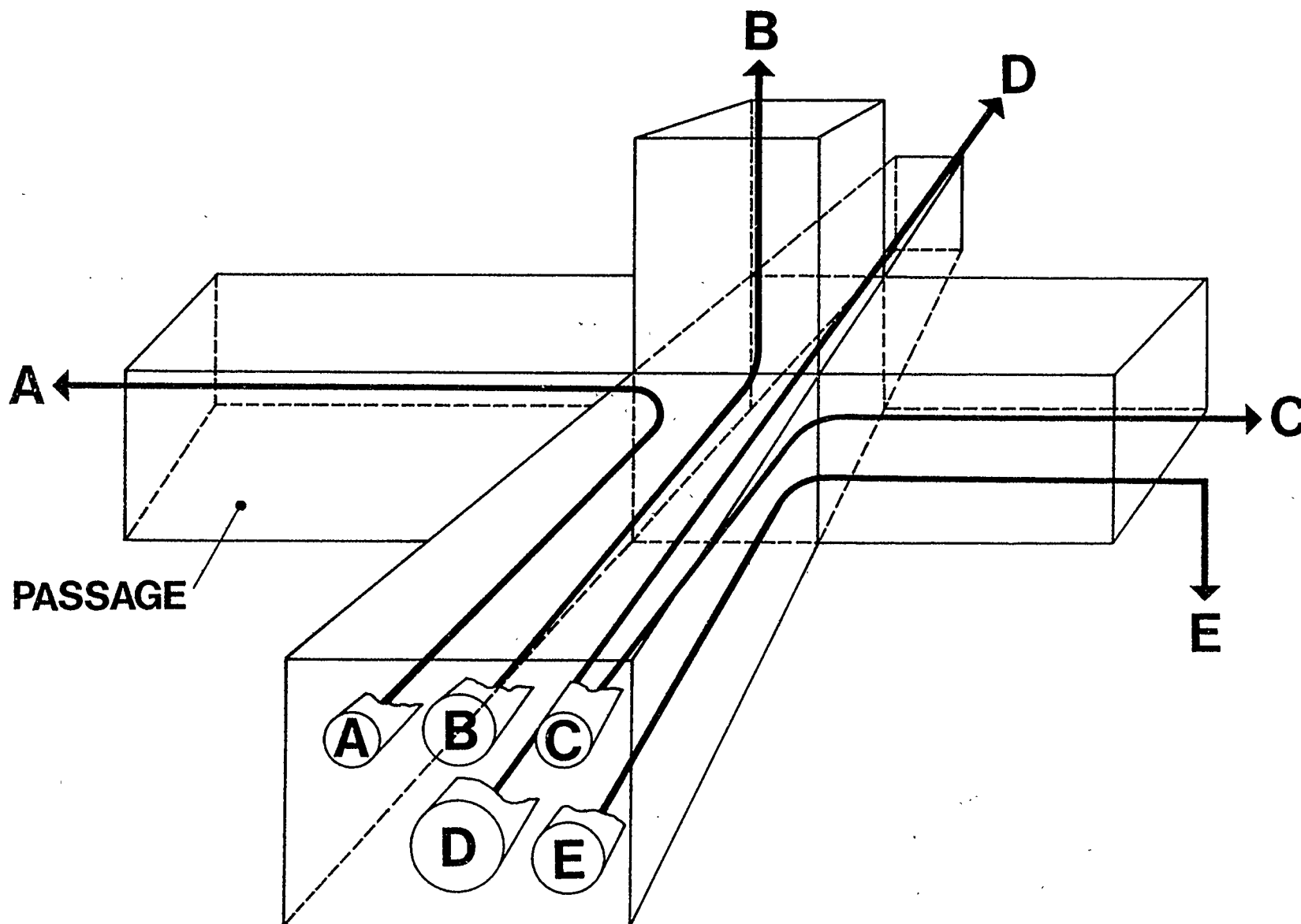
3 RING MAIN



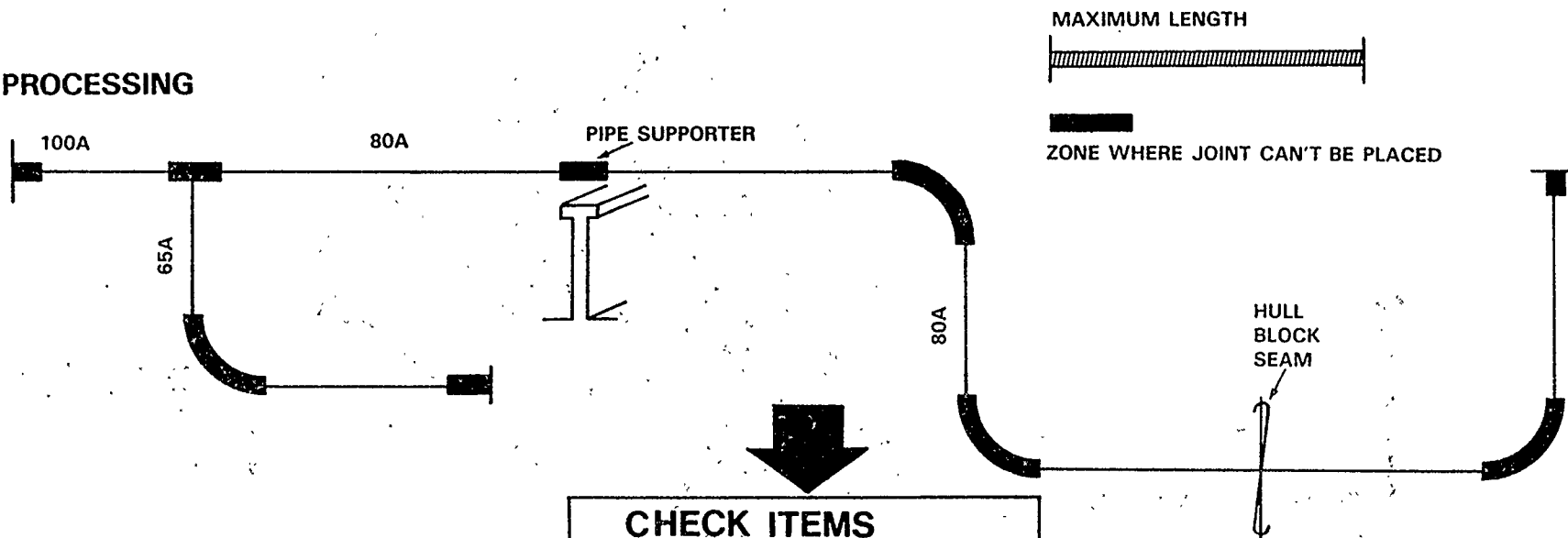
4 ANCHOR POINT—SEQUENCE







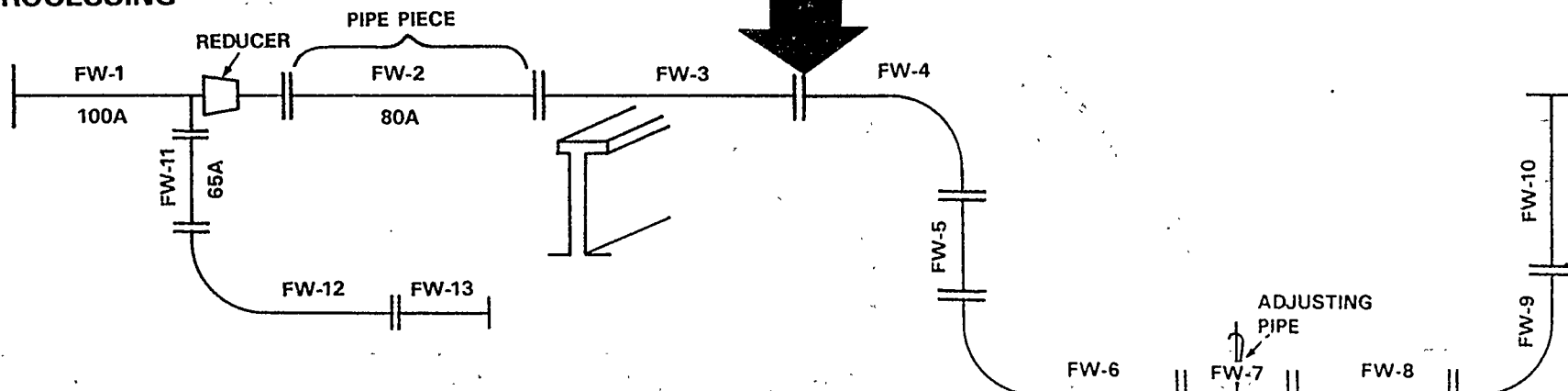
BEFORE PROCESSING



CHECK ITEMS

- PLATING BATH
- COATING & LINING
- BENDING CONDITIONS
- OTHERS

AFTER PROCESSING



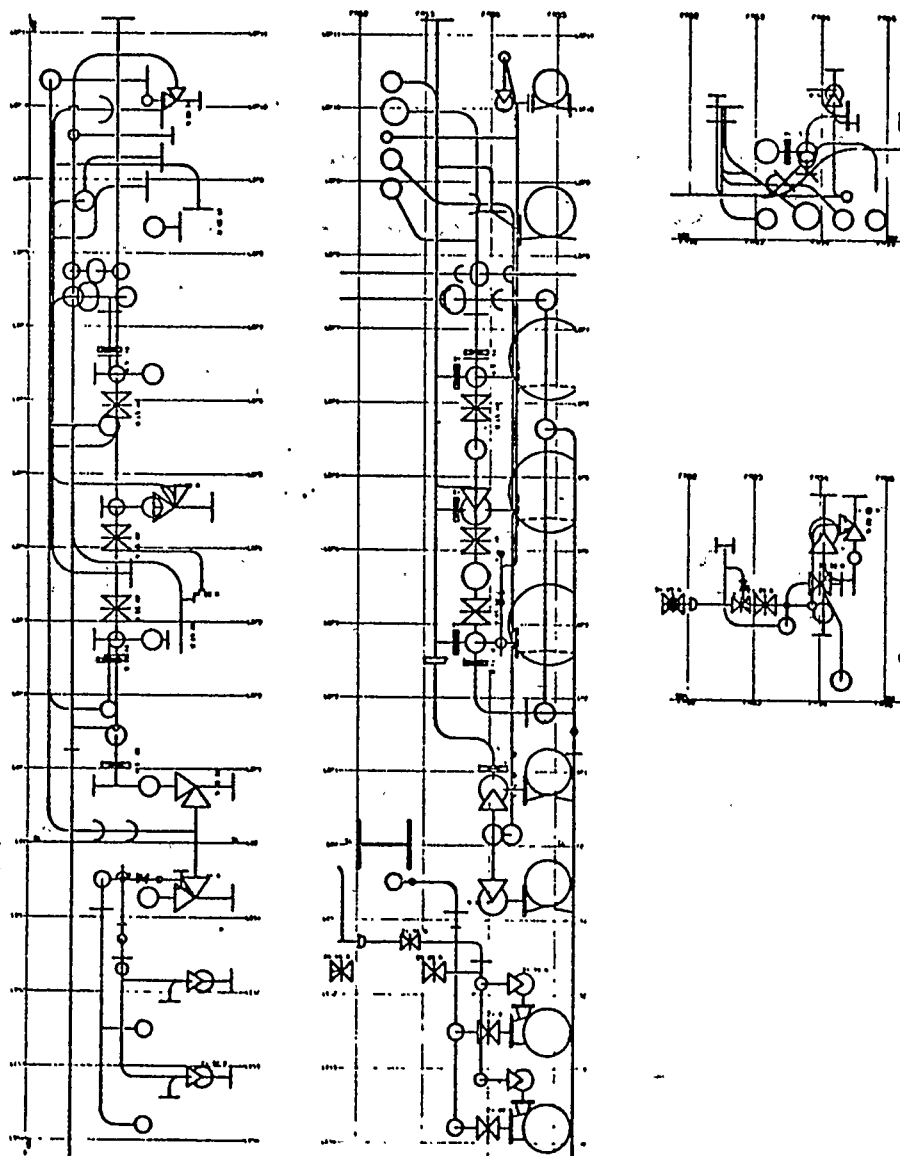
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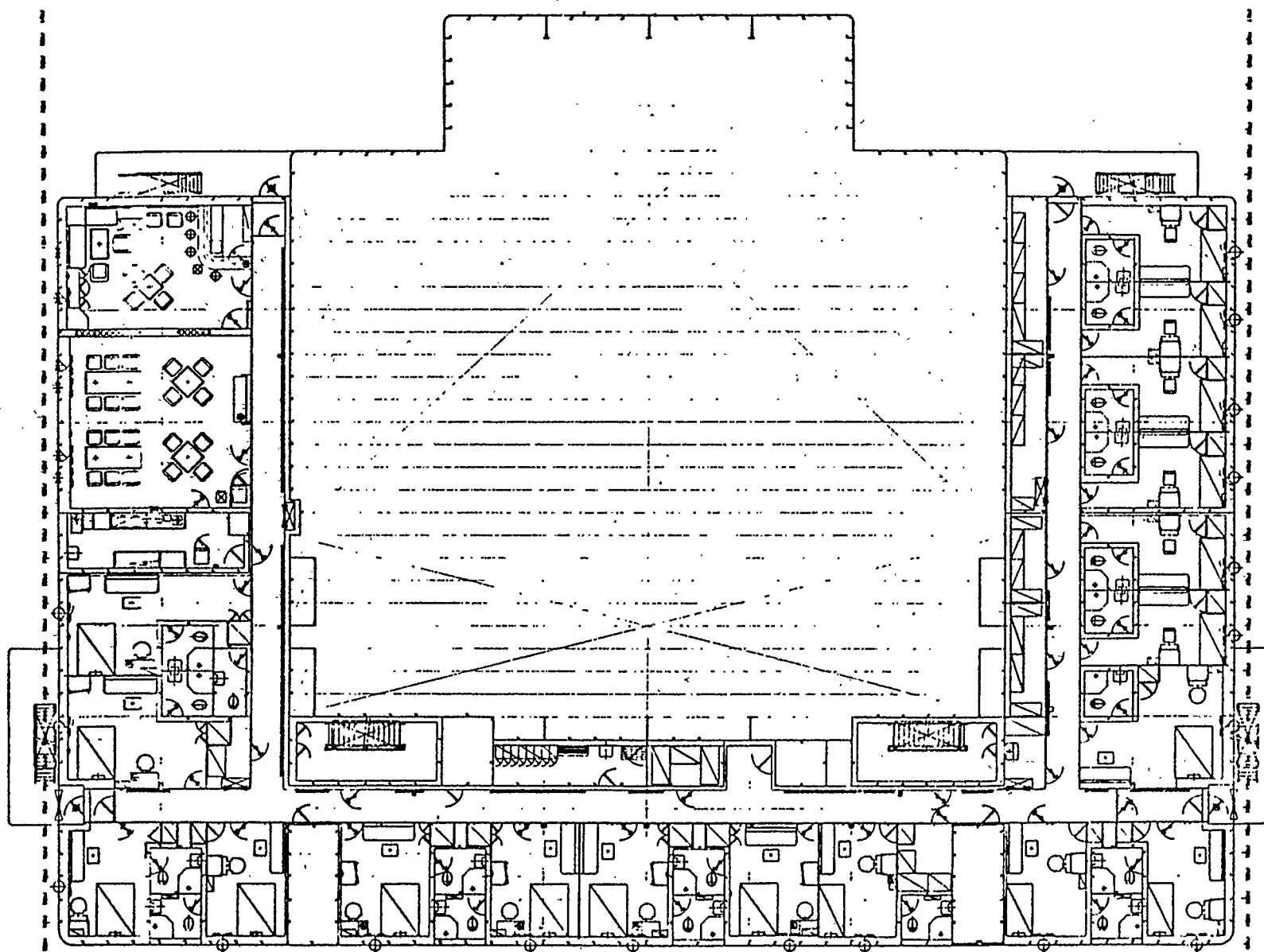
- SPEC. OF THE DRAWING CAN BE FREELY INDICATED

(VIEW DIRECTION, DRAWING AREA, OBJECT TO BE DRAWN, ETC)

- THE FOLLOWING CAN BE AUTOMATICALLY DRAWN

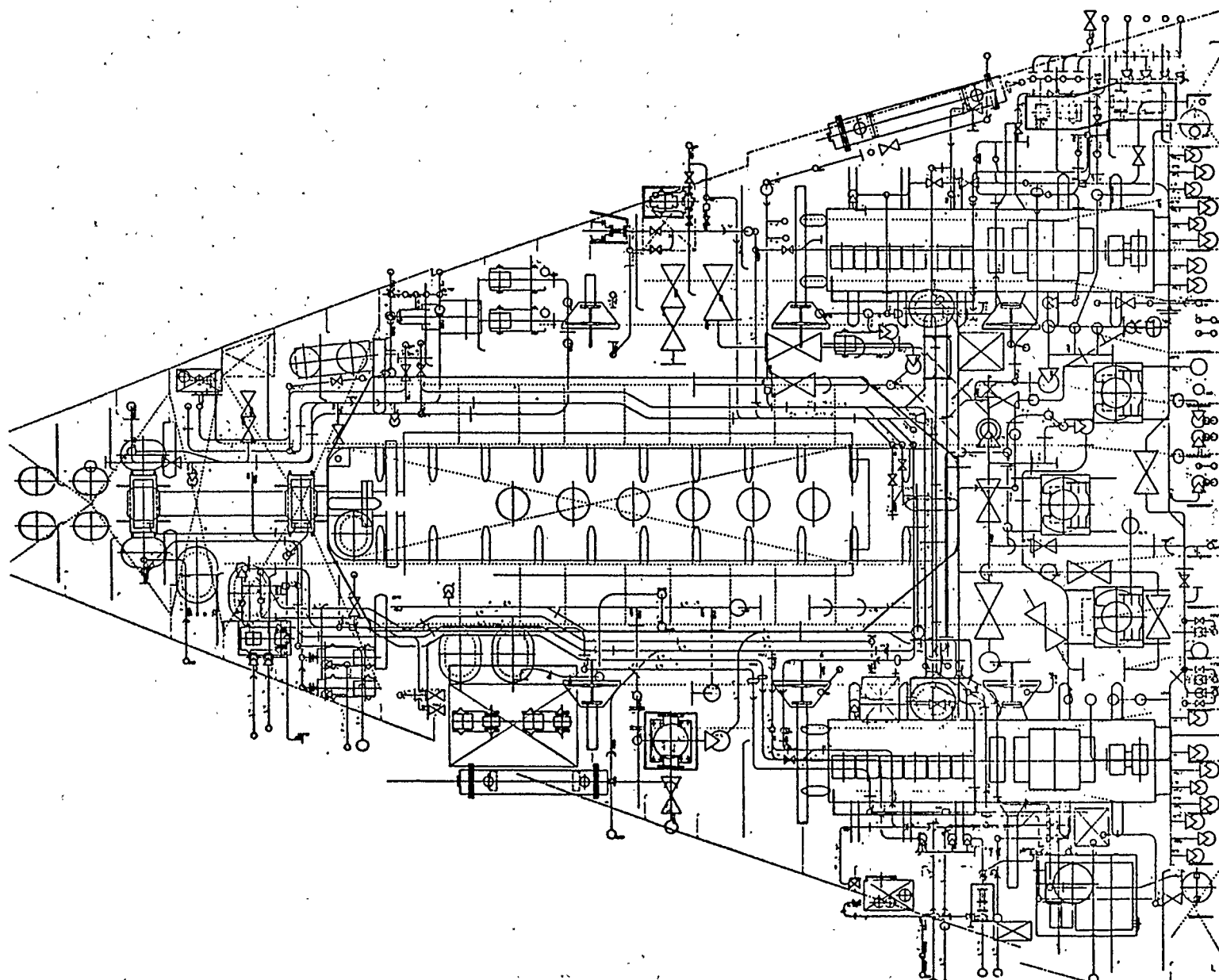
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2. RELATIVE POSITION OF PIPELINES FROM HULL STRUCTURE
3. PIPE PIECE NO., HIGHT OF PIPELINES, DIA. OF PIPES, NAME OF HULL STRUCTURE
4. OTHERS

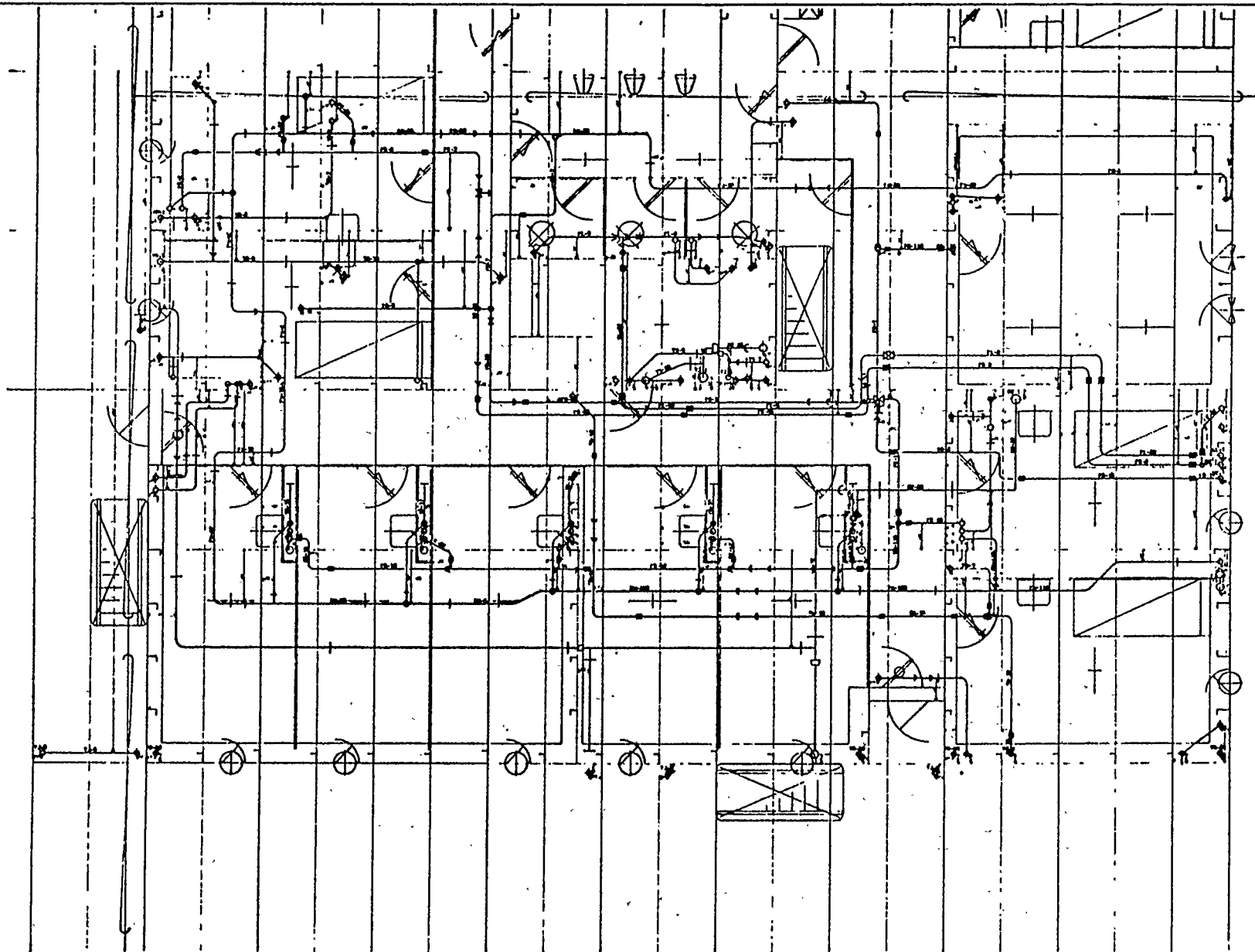




HICAS-P

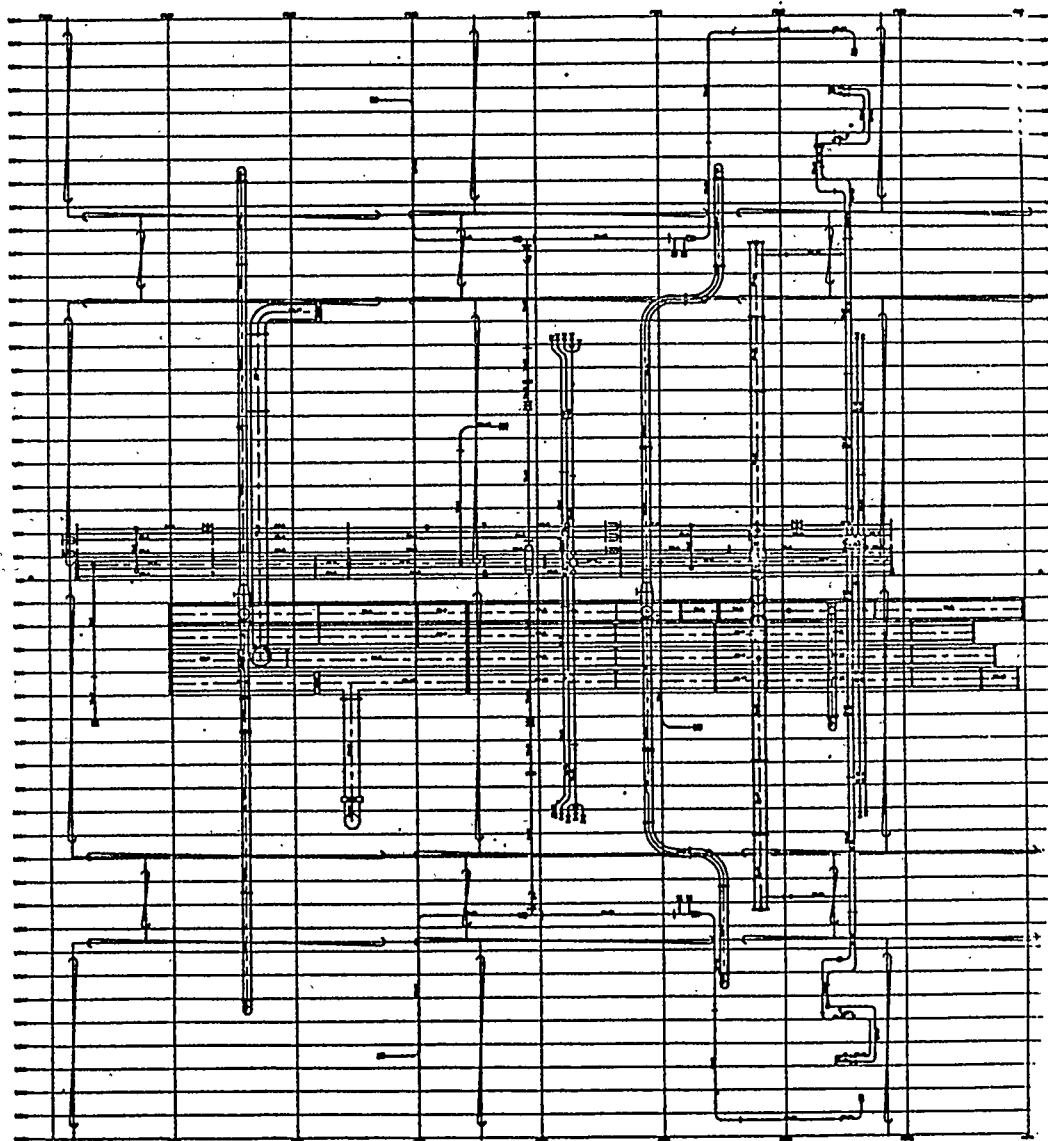
PIPING ARRANGEMENT (ENGINE ROOM)



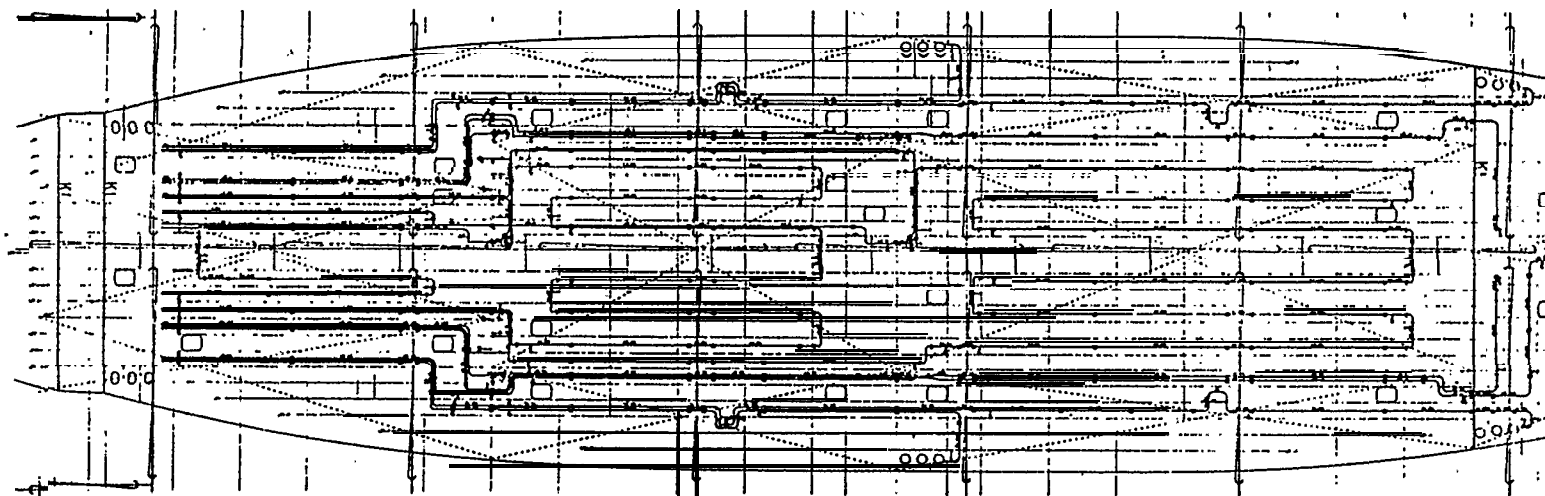


HICAS-P

PIPING ARRANGEMENT (ON DECK)

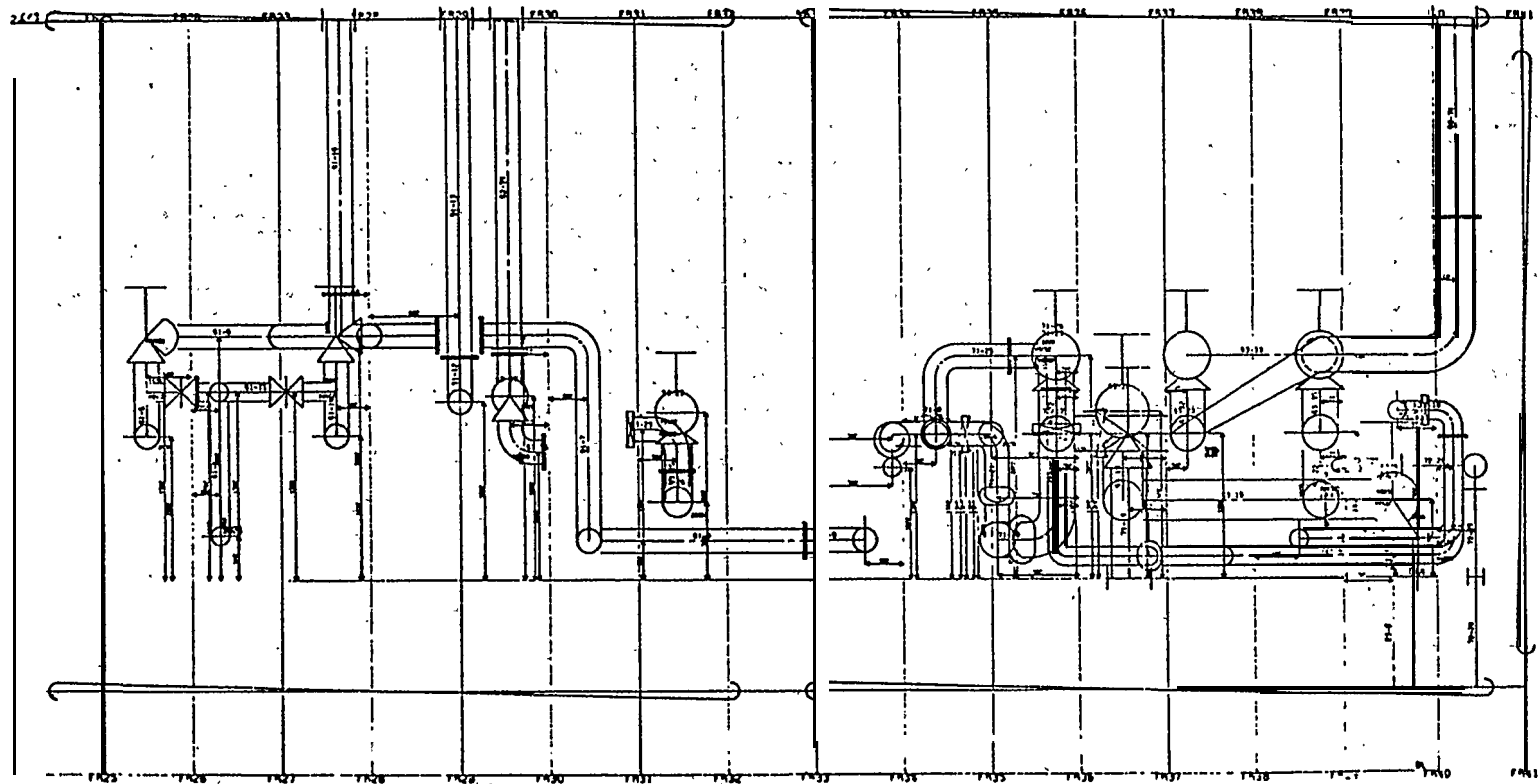


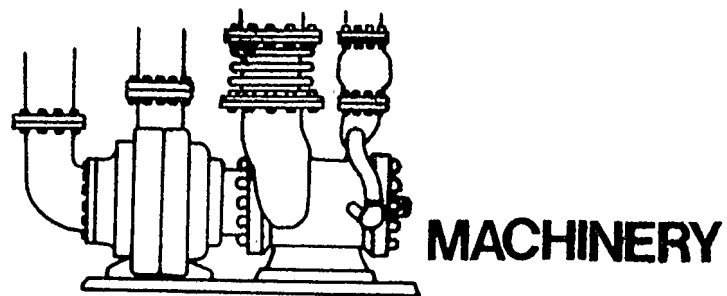
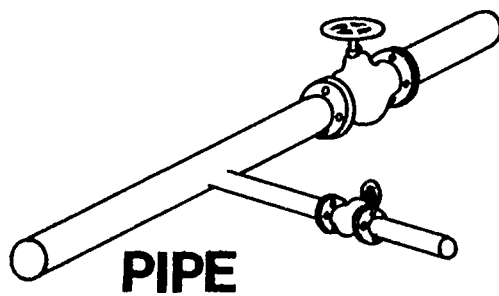
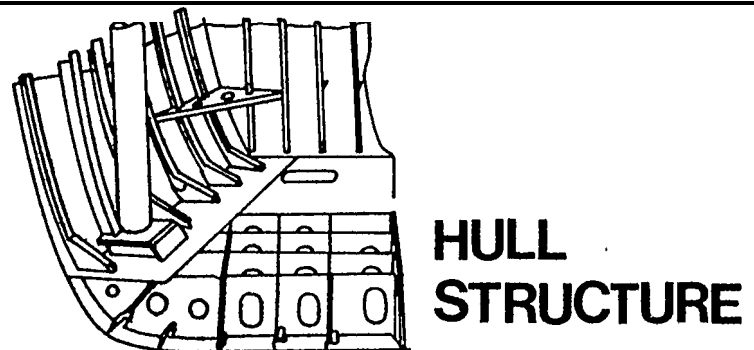
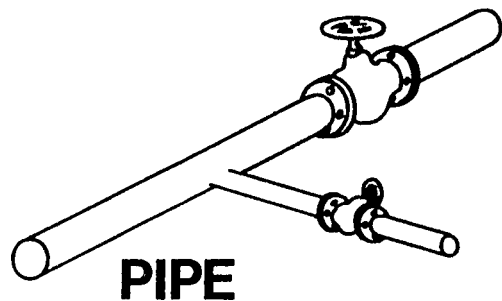
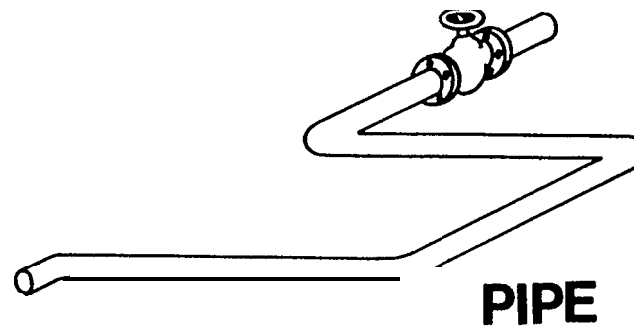
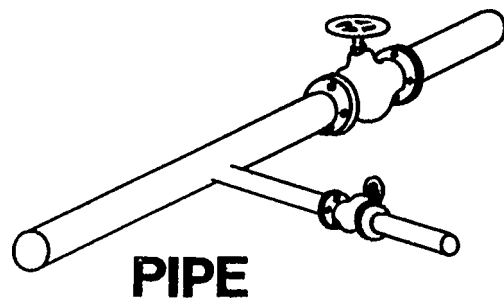
HICAS-P PIPING ARRANGEMENT (IN DOUBLE BOTTOM)



HICAS-P

PIPING ARRANGEMENT (ENLARGEMENT, ELEVATION)





HICAS-P

INTERFERENCE CHECK LIST

----- HICAS-P INTERFERENCE CHECK LIST -----

** S.NO=4484, SHOP=NA, SHEET NO=77AM6-04, DESIGNER=

** DATE 76/01/29

PAGE 9 **

NO. 33 PIPE TO PIPE (P.NO= 3, P.NO= 163, L.NAME=LI 2 , SEQ= 7) TC (P.NO= 166, P.NO= 167, L.NAME=LI 2 , SEQ= 8)

P.NO= 3	A-F:FR28 F 414	P.NO= 163	A-F:FR28 F 414	P.NO= 166	A-F:FR28 F 400	P.NO= 167	A-F:FR28 F 400
	P-S:LGS5 P 127		P-S:LGS5 P 127		P-S:LGS5 P 120		P-S:LGS5 P 120
	U-D:DBM U 357		U-D:DBM U 507		U-D:DBM U 1380		U-D:DBM U 507

***** INTERFERENCE DEPTH= 45 *****

NO. 34 PIPE TC JOINT (P.NO= 9, P.NO= 233, L.NAME=LI 2 , SEQ= 13) TC (P.NO= 170, L.NAME=LI 2 , SEQ= 9, JOINT NAME= FL

P.NO= 9	A-F:FR35 A 209	P.NO= 233	A-F:FR36 A 215	P.NO= 170	A-F:FR36 A 74
	P-S:LGS8 P 90		P-S:LGS8 S 306		P-S:LGS8 S 28
	U-D:DBM U 317		U-D:DBM U 317		U-D:DBM U 330

***** INTERFERENCE DEPTH= 90 *****

NO. 35 PIPE TO PIPE (P.NO= 171, P.NO= 172, L.NAME=LI 2 , SEQ= 9) TC (P.NO= 184, P.NO= 185, L.NAME=LI 2 , SEQ= 10)

P.NO= 171	A-F:FR33 A 116	P.NO= 172	A-F:FR31 F 209	P.NO= 184	A-F:FR33 A 120	P.NO= 185	A-F:FR31 A 41
	P-S:LGS7 P 190		P-S:LGS6 S 109		P-S:LGS7 P 20		P-S:LGS6 S 215
	U-D:DBM U 330		U-D:DBM U 330		U-D:DBM U 324		U-D:DBM U 324

***** INTERFERENCE DEPTH= 43 *****

NO. 36 PIPE TO PIPE (P.NO= 171, P.NO= 172, L.NAME=LI 2 , SEQ= 9) T (P.NO= 183, P.NO= 184, L.NAME=LI 2 , SEQ= 2)

P.NO= 171	A-F:FR33 A 116	P.NO= 172	A-F:FR31 F 209	P.NO= 183	A-F:FR36 A 175	P.NO= 184	A-F:FR32 A 226
	P-S:LGS7 P 190		P-S:LGS6 S 109		P-S:LGS7 P 450		P-S:LGS7 P 173
	U-D:DBM U 330		U-D:DBM U 330		U-D:DBM U 324		U-D:DBM U 324

***** INTERFERENCE DEPTH= 43 *****

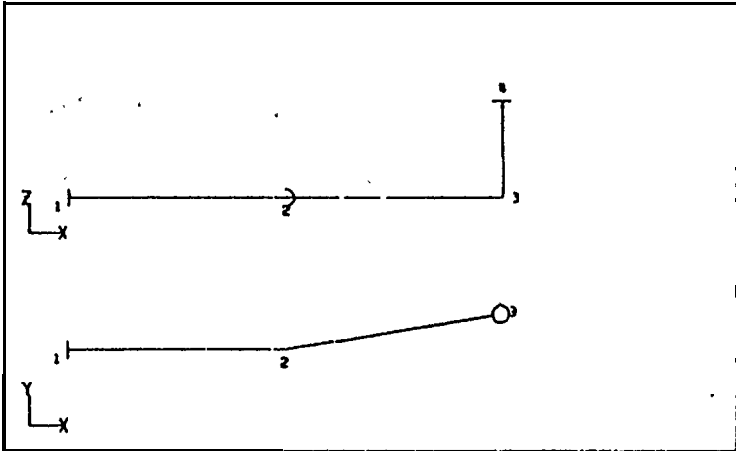
PIPE PIECE DRAWING

235

S-NO.4484(M)		SHEET NO.77A8G321 (REV-1)		DATE:76/02/21		PAGE: 471	
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AM- 980 -	1		2				

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41 F - 10- 25-	SS41	1	OK 0.01
11 F - 10- 25-	SS41	1	OK 9.51

< BENDING INFORMATION >	
1ST. P L NC-L FA A L NC-L RA A L NC-L RA A	
1 12761 7761 45.0 90.0 6101 4731 -90.0 9.4	



SHAPE OF PIPE PIECE (PROJECTION)

< MEASUREMENTS OF PIPE PIECE >	
FM TO (KIND) ANG OTHER	NAME
1- 11 FL	F - 10- 25-
1- 21 BR 9	600
2- 31 BR 90	600 100
3- 41 FL	F - 10- 25-
2781	2781
TOTAL LENGTH: X- 1200 Y- 100 Z- 278 TOTAL WEIGHT: 6KG	

M:	IC:	ID:	IF:	IM:	IG:	IS:	IE:	IM:
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HICAS-P

PURCH. ORDERS FOR FITTINGS

***** VALVE LIST (FOR PURCH. ORDER) *****

* SNO 4432

* GLOBE & ANGLE VALVE (CAST STEEL)

OPERATION

M : MANUAL

H : HYDRAULIC

PN : PNEUMATIC

RH : REACH ROD

RY : REACH ROD - YOKE

S : SELF OP.

E : ELECTRIC

HANDLE

YOKE

PURCH. ORDER

P- 12

4YH-1012

PAGE- 1

VALVE MARK	TYPE	RAT (K)	IN.D. (MM)	MAT'L	LIST STANDARD	OPERATION	REQ. NO.	VALVE NO.	LOCATION	APPLICATION	WEIGHT (KG)	REMARKS
GSV		101	100	SC	IF7319	M	21	DSV- 2, 3	FWD. SPACE	DK STEAM	44.80	
GSV		101	50	SC	IF7319	M	21	DSV- 8, 9	UPPER DECK	DK STEAM	17.90	
GSV		101	80	SC	IF7319	M	11	DSV- 51	UPPER DECK	DK STEAM	29.80	
GSV		101	100	SC	IF7319	M	91	DSV- 4~ 7 DSV- 47~ 49 DSV- 52, 53	UPPER DECK	DK STEAM	44.80	
GSV		101	125	SC	IF7319	M	11	DSV- 50	UPPER DECK	DK STEAM	69.80	
GSV		101	200	SC	IF7319	M	11	DSV- 37	UPPER DECK	DK STEAM	158.00	
GSV		101	250	SC	IF7319	M	11	DSV- 46	UPPER DECK	DK STEAM	257.00	
GSV		101	65	SC	IF7319	M	21	DSV- 34, 35	AUX. P. RM.	DK STEAM	26.10	
GSV		101	125	SC	IF7319	M	11	DSV- 36	AUX. P. RM.	DK STEAM	69.80	
GSV		101	100	SC	IF7319	M	21	DSV-100,103	AFT. SPACE	DK STEAM	44.80	
GSV		101	150	SC	IF7319	M	21	DEV- 24, 27	MAIN P. RM.	DK EXHAUST	96.30	
GSV		101	250	SC	IF7319	M	31	DSV-125,127 DSV-128	MAIN P. RM.	DK STEAM	257.00	
GSV		201	100	SC	IF7313	M	61	DSV-110,112 DSV-114,115 DSV-117,119	MAIN P. RM.	DK STEAM	62.30	
GSCV		201	250	SC	IF7473	RH	11	SOV-117	MAIN P. RM.	STRIPPER	349.00	
ASCV		101	50	SC	IF7472	M	21	DSV- 62, 63	UPPER DECK	DK STEAM	16.30	
ASCV		51	300	SC		H	11	WBV-105	MAIN P. RM.	WATER BALLAST	310.00	

TABLE OF PIPE PIECES

HICAS-P TABLE OF CONTENTS (FOR PIPE PIECE DRW.)

(WEIGHT:KG LENGH:M) DATE=10/25/77 PAGE= 2

[illegible]

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BILL OF MATERIALS

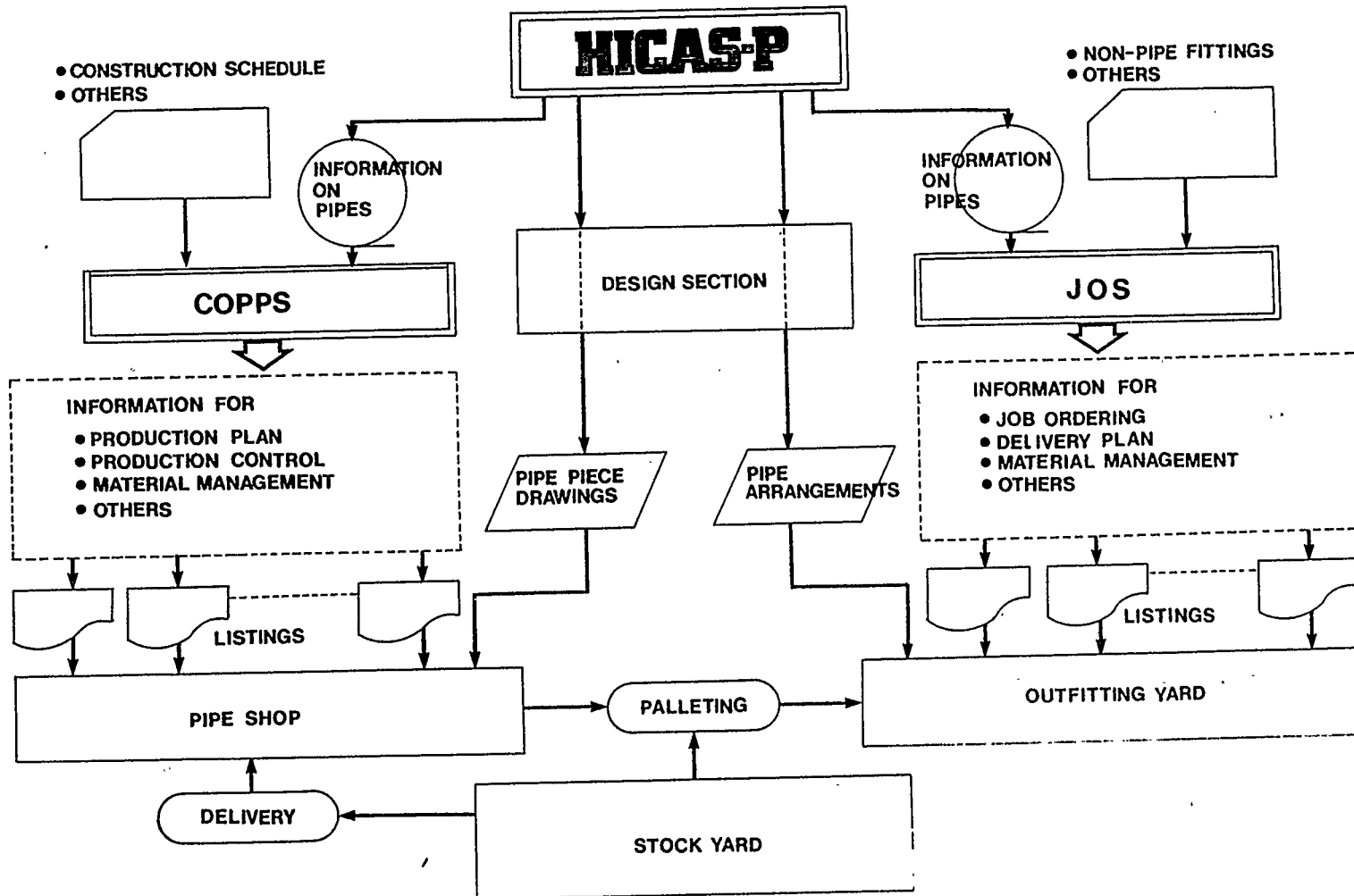
HICAS-P TABLE OF MATERIALS

*** MATL.FIAL=KAW PIPE

DATE=10/21/77 PAGE= 2

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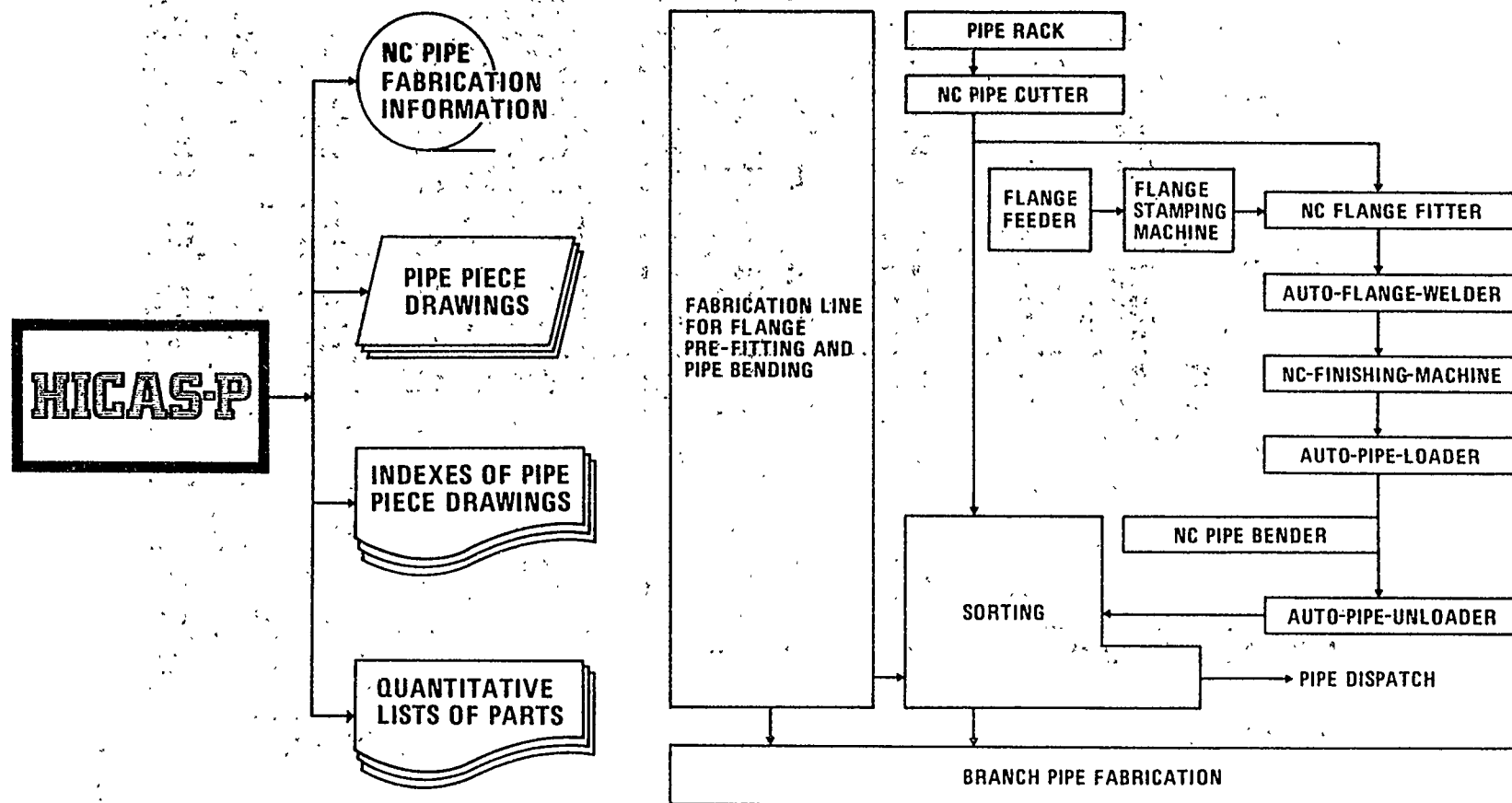


240

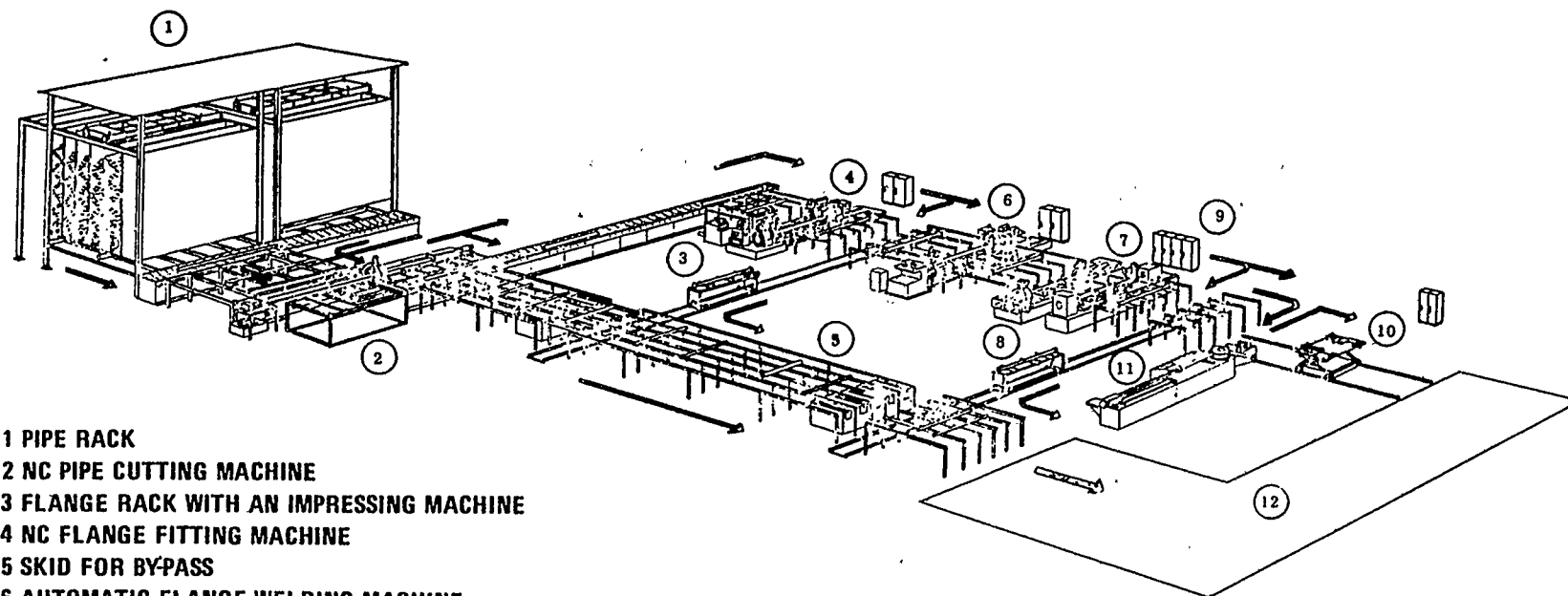
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HICAS-P TYPICAL FLOW OF NC PIPE FABRICATION SYSTEM



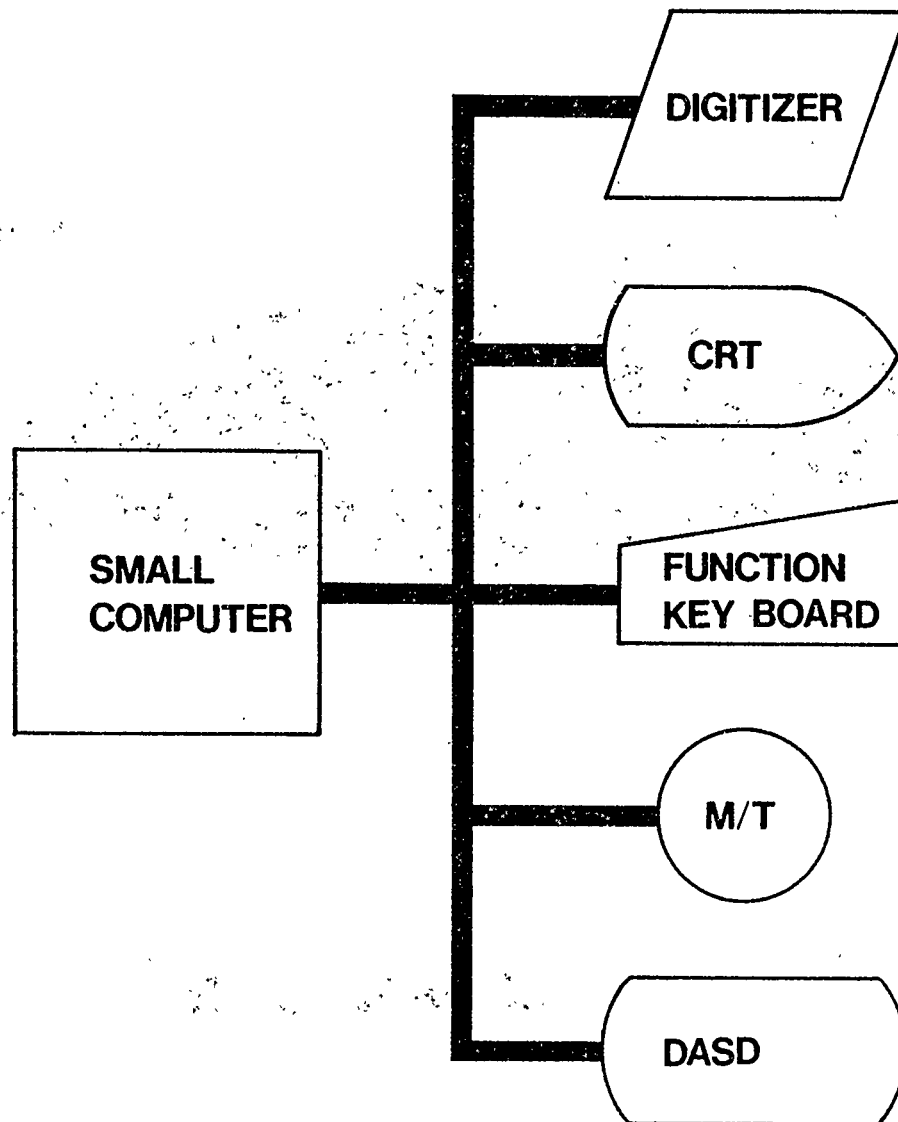
243



- 1 PIPE RACK
- 2 NC PIPE CUTTING MACHINE
- 3 FLANGE RACK WITH AN IMPRESSING MACHINE
- 4 NC FLANGE FITTING MACHINE
- 5 SKID FOR BY-PASS
- 6 AUTOMATIC FLANGE WELDING MACHINE
- 7 NC PIPE FINISHING MACHINE
- 8 DOLLY FOR BY-PASS
- 9 CONTROLLER
- 10 PIPE UNLOADING DOLLY
- 11 NC PIPE BENDER
- 12 SORTING STAGE

HICAS-P

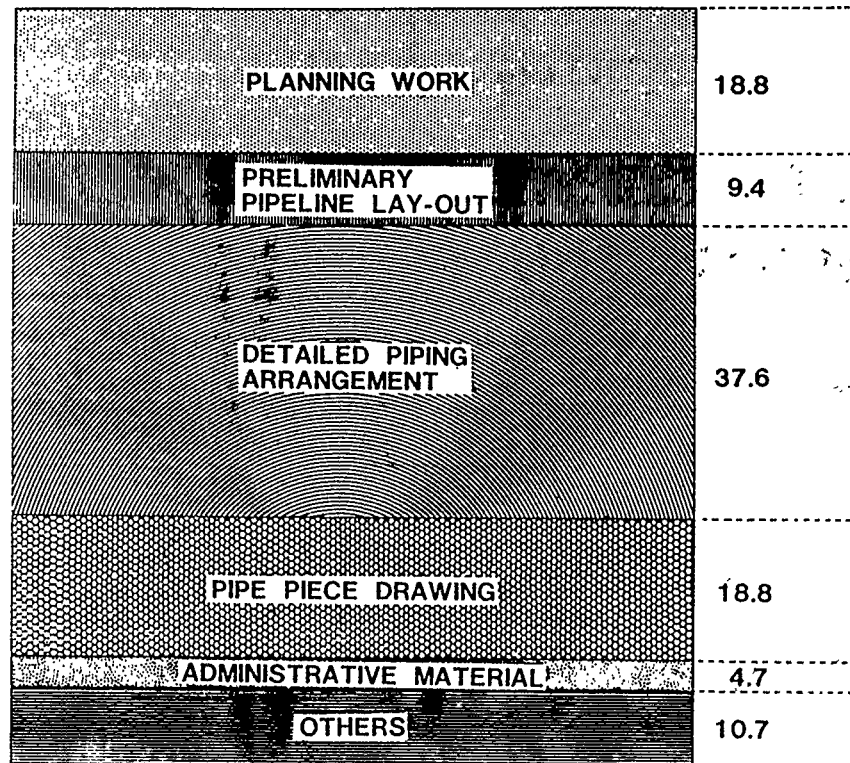
PF HARDWARE CONFIGURATION



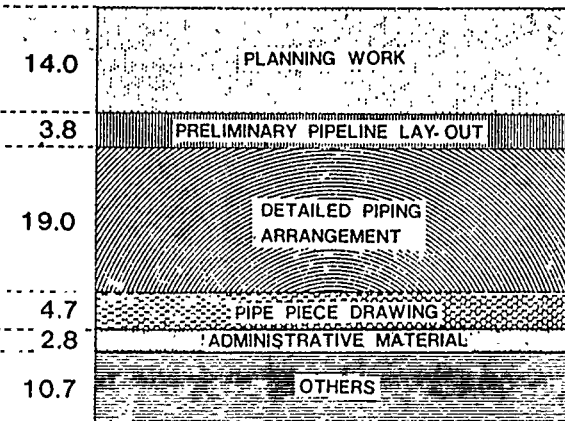
HICAS-P

HIGH EFFICIENCY

BEFORE USING HICAS-P



AFTER USING HICAS-P



100.0

55.0

- REDUCTION OF PIPING DESIGN TERM
- PREVENTION OF ERRORS IN DESIGN & MANUFACTURE
- NOT WANTED SKILLED PIPING DESIGNER
- INFORMATION SUPPLY FOR PIPING CONTROL SYSTEM
- OTHERS

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